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USSR Report

ENERGY

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USSR REPORT

ENERGY

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ENERGY CONSERVATION

GENERAL

OIL AND GAS

UDC 553.98.061.15

NEW CONCEPT ON EFFECTS OF PREVIOUS-GENERATION GASES ON OIL AND GAS ACCUMULATIONS

Moscow NEFTYANAYA PROMYSHLENNOST': SERIYA 'NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA' (REFERATIVNYY NAUCHNO-TEKHNICHESKIY SBORNIK) in Russian No 10, Oct 83 pp 1-2

[Article by V. P. Stroganov of VNIIOENG [All-Union Scientific-Research Institute for the Organization, Management and Economics of the Oil and Gas Industry]]

[Text] By gases of previous generations (GRG's), the author means biochemical and early catagenetic gases that are formed at depths of 0 to 1.5-2 kilometers, when the gas-producing series has not yet entered the main oil-forming zone (GZN). In relation to GZN's, these are gases of the "pre-oil" generation. The role of the GRG's in the forming of gas deposits in upper lithological strata of shallow deposition has been widely elucidated in the works of F. A. Alekseyev, V. V. Veber, V. P. Zhizhchenko, V. I. Yermakov, L. M. Zor'kin, V. S. Lebedev, S. P. Maksimov, I. I. Nesterov, M. N. Rudkevich, Ye. V. Stadnik and other researchers.

The author (V. P. Stroganov, 1980) carried out a comparative analysis of all the shallow-deposition zones of gas accumulation on the Central Euro-Asiatic platform, as a result of which the prerequisites for the conservation and accumulation of GRG's were determined.

However, the role of GRG's in bringing about the presence of gas in deeply deposited stata is not completely clear, although undoubtedly some mass of GRG's must have been preserved in the sedimentary stratum and was submerged with it to great depths. There are practically no publications on this subject. Various aspects of the problem have been discussed in the author's works (V. P. Stroganov--1974, 1976 and 1980).

The author's calculations, using the data of S. G. Neruchev, V. N. Kortsenshteyn, V. P. Savchenko and N. M. Kruglikov, indicated that in the sedimentary series that lies at depths of 5-6 kilometers and is characterized by low (1-2 percent) humous-type OV [organic matter] content, the amounts of methane formed only in the deep zone at the MK_4-MK_5 stages, even taking MK_3 stage methane into account, actually are not enough to saturate the brine water to the maximum and to create the "critical" gas saturation, which is 10 percent of

the interstitial space, at which the autonomous deep process of the forming of gas deposits goes on intensely. Although deep gas is formed, it goes into the creation of "dead" gas saturation. At the same time, if the amounts of gas of the preceding MK_2 and MK_1 stages, and also of the PK stage, and a portion of the biochemical methane are added to the deep methane, then the process of gas accumulation at great depths can proceed intensively, even where the OV content is 1 percent.

Researchers have never posed the problem of determining the dependence of the deep gas accumulation on preservation of the "upper" gases. Obviously, it was considered self-evident that the gas that is found in the deeper deposits was formed only by the "lower" gases. The lack of gas accumulations in the deep zone was explained by an insufficient amount of "deep" gases. The question of the causes of this phenomenon was considered irrelevant and connected in no way with the prerequisites for preserving the "upper" gases. However, calculations have indicated the possibility of a tie between the "upper" and the "lower" gases.

In order to solve the problem being examined, the author studied all the deep depressions found in the West Siberian, Turonian and Scythian platforms, in which the parent rocks of Triassic and Lower + Middle Jurassic oil and gas were submerged to depths where the deep phase of methane generation was executed, that is, the process of transforming organic matter reached the M_4-M_5 stages and more.

The degree of preservation of the GRG's was evaluated by the geological-analogy method. It was considered that, for purposes of conserving GRG's in a certain series, caps had to be formed above the gas-producing suite that were similar in the duration of accumulation, thickness and lithological composition to the Turonian-Danian or the Maykop regional screens on the West Siberian and Scythian platforms, at which accumulations with gases of a previous generation are found at shallow depths (F. A. Alekseyev, I. I. Nesterov and others).

Thus, it is necessary first of all to determine the thickness and lithological composition of the strata that were deposited above the caps of deeplying NGM's [oil and gas parent rock) of the suite for 20-25 million years, for it was during precisely this period that the Turonian-Danian and Maykop clay caps were accumulated. For the cap above the Middle Jurassic NGM strata, this period corresponds approximately to Late Jurassic time, the total duration of which was 21 million years. Consequently, for the deep Jurassic depressions, an analysis must first be made of the thickness and lithological composition of the Upper Jurassic series.

In determining the prerequisites for conserving GSG's, not only the cap parameters but also the presence or absence of deep erosion of the sediments that had already been accumulated must be considered. Thus, fairly thick carbonaceous clayey strata were formed above the Lower Triassic (Olenekian) oil and gas parent sediments, but they were subject to deep erosion in pre-Jurassic time. An analysis of the intensity of the erosion also helps in evaluating the conditions for the conservation of GRG's.

Jurassic and Triassic depressions are subdivided into four groups, according to the conditions for the conservation of GRG's.

Group 1 includes depressions where especially favorable conditions for preserving GRG's have been noted in Jurassic sediments. These include the Amu-Dar'ya tectonic depression and the East Kuban trough. The regional cap above the Middle-Jurassic gas-producing sediments is even better than above the Turonian-Danian sediments, since the thickness of the Upper Jurassic rock reaches 2,000 meters, and among them are thick strata of salts and anhydrites--reliable screens that prevent diffusive dispersion of the gases.

Group 2 is represented by the Yenisey depression, where conditions were favorable but somewhat worse than for group 1 for GRG preservation, since the thickness of the clay rock here reaches 800-900 meters. The cap is identical to the Turonian-Danian.

Group 3 includes regions with very favorable conditions for preserving gases of previous generations. In these regions, practically complete loss of biochemical and previously catagenetic gases should be assumed. These include Triassic series of the East Ciscaucasian and South Mangyshlak, where large gas losses were occasioned by strong dislocation of a taphrogenic rock complex, which is characteristic for the whole area of its distribution. Deep pre-Jurassic erosion later exerted the strongest influence on the degassing of these rocks. The eroded rocks are 800 meters and more in thickness in some regions. Also contiguous to this group are Jurassic sediments of the East Ciscaucasian, where Upper Jurassic terrigenic carbonate rocks are about 100 meters thick.

Group 4 includes depressions with unfavorable conditions for preserving GRG's that were caused primarily by the negative situation in the Late Jurassic, when only 300-400 meters of rock accumulated. This is 3-fold to 4-fold more than in East Ciscaucasia, but one-half to one-third the thickness of the Turonian-Danian clay cap. This group includes deep depressions of the North Ustyurt-Beyneu, Kosbulak and Barsakelmes depressions, as well as the troughs of South Mangyshlak.

A comparison of the conditions for preserving GRG's in Jurassic and Triassic series with the phase state of the contained hydrocarbons has enabled a most important consistency to be discovered. The gas accumulation zones are in deep depressions or in tectonic elements adjacent to them, where conditions favorable for GRG conservation have been noted (the Amu-Dar'ya, the East Kuban and the Yenisey), and oil accumulation zones are in depressions where GRG's were lost (East Ciscaucasia, South Mangyshlak--Triassic and Jurassic, and North Ustyurt troughs). It follows from this consistency that deep submergence of the NGM strata and execution of the deep phase of generation do not lead preferentially to the presence of gas in all deep depressions. Thus, at the Central Euro-Asiatic platform, the preferential accumulation of gas was noted in only 3 out of 11 depressions, and in 7 a "stunted" accumulation of gas, which helped to preserve oil accumulations in traps, was established.

In oil-bearing depressions, GRG losses caused strong degassing of Jurassic and Triassic strata back in the initial stage of their submergence. Further submergence into the deep zone of intense methane generation led to the water-drive system of this sedimentary series, which was undersaturated with gas apparently neutralizing the deep phase of methane generation and "absorbing" the high-temperature genesis methane that was dissolved in the brine.

The analysis that was made enables a new concept to be formulated, which can be called the "concept of the permanent (that is, constant, long-term and continuous) influence of the gases of an earlier generation on the process of the forming of gas and oil accumulations." It is distinguished radically from known notions by a recognition of the enormous influence of the GRG's. It embraces not only the upper sections of the mantle, which was known, but also the deeplying series of the sedimentary cover. As to qualitative characteristics, the influence of the GRG's can be subdivided into the active and the passive.

The active influence of the GRG manifests itself differently. First, it is known that the gas-bearing zones in the upper lithological complexes are being formed through these gases under certain conditions (V. P. Stroganov, 1980).

Second, the process of forming gas-bearing zones in a deep-lying stratum often arises only where gases of a previous generation are preserved. The addition of "upper" and "lower" gases causes a large zone of gas accumulation with gas of mixed genesis to form. Thus, the process of deep gas accumulation proves to be dependent upon the preservation of the GRG's.

Moreover, the passive effect of GRG's is noted. It is associated with GRG losses, which help to develop oil accumulation zones (where there is stunted gas accumulation) in deep formations, since the "lower," deep gases are not drawn into the forming of gas accumulations because of the absence of earlier-generation gases, but they are expended on saturation of the water-drive system.

The permanent influence of GRG's has been prevalent in sedimentary strata with relatively low concentrations of organic substance (1-2 percent and, possibly, somewhat more).

From a practical standpoint, it is important that the new regional criterion for separate forecasting of gas-bearing and oil-bearing zones in deep-lying strata, which, for brevity, can be called "the criterion of the initial stage," be substantiated.

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STRUCTURE OF WESTERN PORTION OF FERGANA TROUGH

Moscow NEFTYANAYA PROMYSHLENNOST': SERIYA 'NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA' (REFERATIVNYY NAUCHNO-TEKHNICHESKIY SBORNIK) in Russian No 10, Oct 83 pp 3-5

[Article by Ye. V. Lebzin, V. B. Romov and V. A. Arutyunov of SredAzNIPIneft' [Central Asian Scientific-Research and Design Institute for the Oil Industry]]

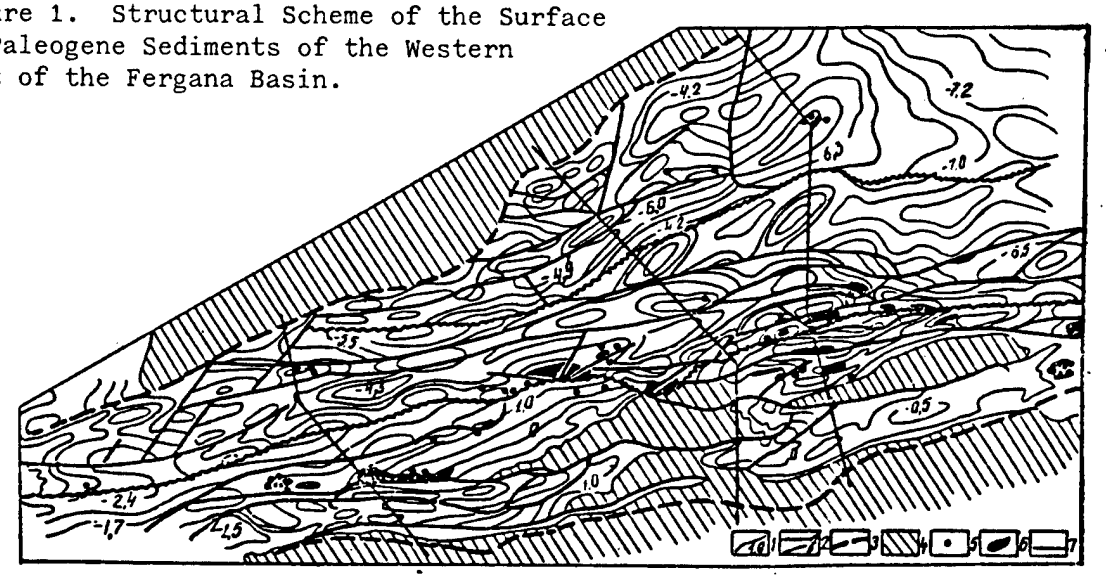
[Text] The western portion of the Fergana trough embraces lands of North Tajikistan, Kirghizia and Uzbekistan that hold promise for oil and gas prospecting.

Each year the prerequisites for prospecting for and exploring oil and gas fields, which are becoming more complicated, are moving questions of improving geological exploration, which cannot be solved without choice of optimal regions for prospecting, to first priority. The effectiveness of operations and the area for conducting them are determined to a great extent by the level of knowledge about the structure of a region that is promising for oil and gas prospecting, about dimensions, configurations and amplitudes of anticlines, synclines, and faults, and about the hypsometric position of the arch portions of uplifts and the axial portions of the troughs.

In order to answer these questions, a detailed structural map of the surface of the Paleogene (the main oil and gas bearing series) that reflects the main features of the structural plane of the sedimentary mantle of the area being examined was constructed for the first time, based upon an integrated interpretation and generalization of geological and geophysical information and upon data from remote-indications research. The map is of practical significance because it can be used in planning geological exploration for oil and gas. Figure 1 shows a simplified variant of the map with a larger interval of the cross-section of the structure's contour.

In the modern structure of the Mesozoic-Cenozoic complex of Western Fergana, three large first-order tectonic structural elements are singled out: the North Fergana, the Central Fergana and the South Fergana, which are separated by regional disjunctives and are distinguished by peculiarities of structure and hypsometric position of the surface of the Paleogene sediments. Within the large structural elements that have been identified, intricately developed structural forms of the second order stand out, including blocks, benches,

Figure 1. Structural Scheme of the Surface of Paleogene Sediments of the Western Part of the Fergana Basin.



1. Isohypses of the surface of Paleogene sediments, kilometers.
2. The main dislocations with break in continuity:
   a. Those that separate large first-order tectonic-structure zones within the basin; and
   б. Other dislocations with break in continuity.
3. Borders of the Fergana Basin.
4. Regions in which Paleogene sediments and their emergence on the surface are lacking.
5. Main deep holes drilled within the region.
6. Oil and gas fields.
7. Contour lines.

ridges and troughs, which are complicated by local folds, which are grouped, for the most part, into linearly elongated chains (see figures 1 and 2).

Two large segments are singled out within the North Fergana tectonic structural zone: the Supetau to the east and the Leninabad to the west--divided by the Supetau fault. Distinguishing features of the Supetau segment, which includes the local East Supetau and the Kokand uplifts, are the comparatively small variability in depths of deposition of the Paleogene sediments and the depths of their submergence, which exceed 6-7 kilometers, a maximum for West Siberia.

The Leninabad segment is marked by the more complicated structure of the local folds, their diversity as to size, shape and direction of strike of the axis, and so on. Two fold systems are singled out here: the southern (Akbel) and the northern (Karamazar). The local folds of the Akbel group are accurately recorded on the surface in the form of clusters of uplifts of western, northern and eastern strike. Their arches exposed basically Neogene-Quaternary sediments. The absolute depths of deposition of the Paleogene sediments in

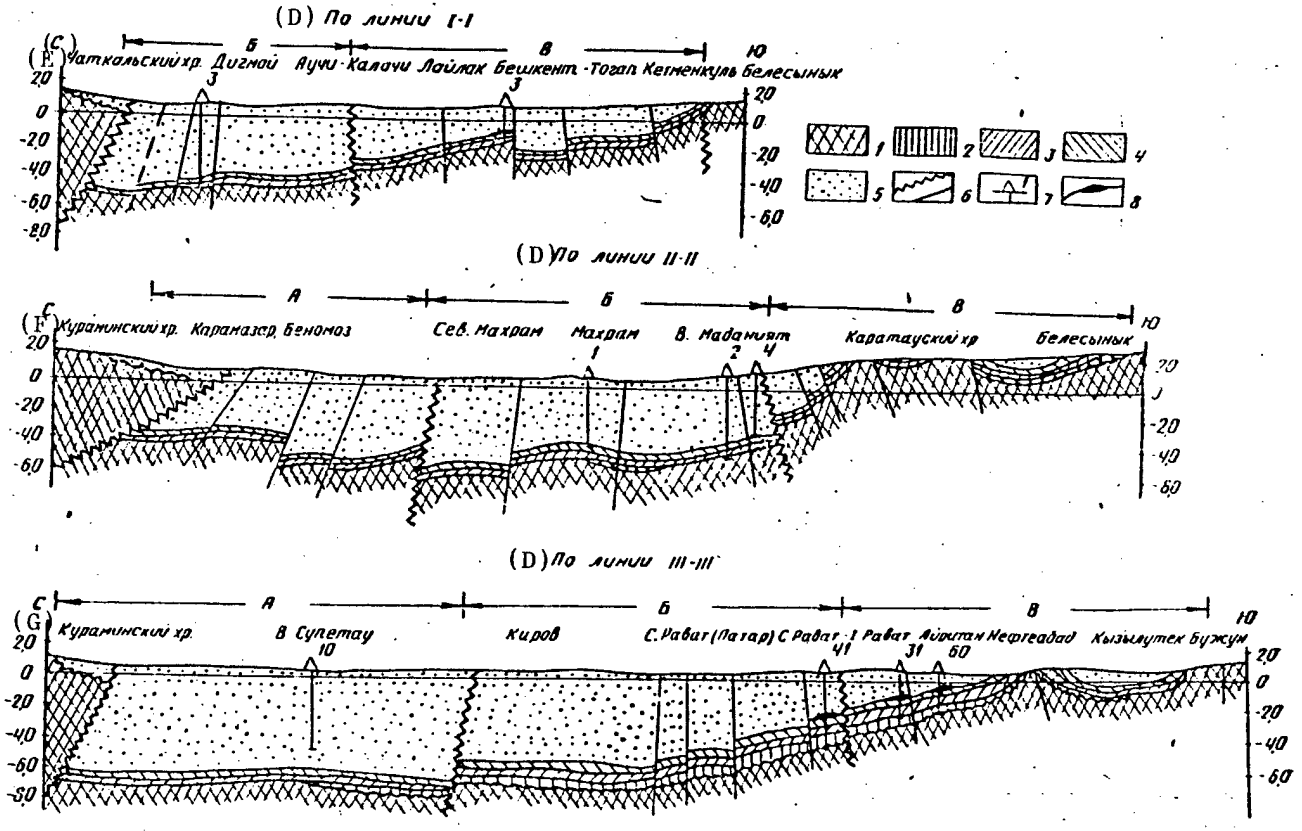


Figure 2. Scheme of the Deep Geological Structure (Geological Cross-Sections) of the Western Part of the Fergana Basin.

Key:

1. Paleozoic.
2. Jurassic.
3. Cretaceous.
4. Paleogene.
5. Disjunctives:

   A. Which divide large structural-tectonic elements of the first order.
   Б. Other disjunctives.
   B. [No legend supplied.]

C. North.
D. Along the lines I-I (and II-II and III-III).
E. Chatkal Reservoir Digmay Auchi-Kalachi Laylak Beshkent-Togan Ketmenkul Belesynyk.
F. Kuramin Reservoir Karamazar Benomoz North Makhram Makhram East Madaniyat Karatau Reservoir Belesynyk.
G. Kuramin Reservoir East Supetau Kirov North Rabat (Patar) North Rabat-I Rabat Ayritan Nefteabad Kyzylutek Buzhun.
Ю. South.

the arches of the folds here vary from -4,600 meters (the Akbel) to 5,800-5,900 meters (the Western Rukhak and the Western Akchop). Their dimensions do not exceed 8x2 kilometers, with an amplitude of 500 meters.

The Karamazar group of folds, which is situated in the northern uplifted part of the Leninabad segment, is distinguished by a diversity of structural shapes, diversity in the direction of the axes, a large number of faults and the presence of structures (Karamazar and Central and Southern Karamazar) that are overlapped by the plane of the North Fergana fault. The sizes of the folds of the western part of the Karamazar group are 4-6x1.5-2 kilometers, with an amplitude of 250-300 meters. The depth of deposition of the Paleogene's cap varies here from 3,100 to 3,400 meters. To the east, the sizes of the folds reach 6-7x1.5-3 kilometers (the Kyzyldzhar and the Western Supetau) with an amplitude of 300 meters. Absolute depths of deposition of the Paleogene cap are 2,800-3,000 meters.

A more typical feature of the structure of the Central Fergana tectonic zone is the development of sublatitudinal folds that are confined to large regional faults in the same direction.

The Central Fergana zone within the Western Fergana is a fairly narrow (14-32 kilometer) trough, which is complicated by longitudinal disjunctives. The largest, the Digmay-Yaypan disjunctive, divides it into the Kayrakkum (in the north) and the Niyazbek-Ravat (in the south) benches, which stretch out in a latitudinal direction. The principal amounts of drilling and of geophysical work has been concentrated at the more closely studied Niyazbek-Ravat bench in recent years. This has enabled more than 20 local uplifts to be found and studied in some degree and 7 oil and gas fields to be discovered.

In the western border portion of the Niyazbek-Ravat bench is the Bakhmal-Shirinsay group of structures, which are marked by comparatively small (2,200-2,400 meters) thickness of the Neogene-Quaternary sediments and insignificant depths to the promising Paleogene rock complex, which ordinarily lies on a Paleozoic foundation.

The Andarsay-Niyazbek line of folds, which stretches out along the descending northern wing of the regional Tuzluk fault, is more elongated. The anticline's dimensions here are relatively uniform--they are 6-7x1.5-2 kilometers. Their amplitudes are 300-350 meters. Depth of deposition of Paleogene sediments in the arches varies from 3,300 to 3,600 meters.

Two more lines of folds (the Madaniyat-North Ravat I and the Kanibadam-Okhchinsk) extend almost parallel to each other in the eastern part of the region. All the folds are elongated in a latitudinal direction and gradually submerge from west to east, which leads to an increase in depth of deposition of the cap of the Paleogene sediments from 3,000 to 4,200 meters. The folds are comparatively small (4-7x1-2.5 kilometers), with amplitudes of 200-400 meters.

The Kayrakkum bench, which is located to the north of the Niyazbek-Ravat, is an extended (up to 140 kilometers) strip that is complicated by practically a single line of folds, which consist of the latitudinally elongated, echeloned Digmay-Makhram anticlines (see figure 1). The folds of this line are,

as a rule, fairly large. All of them are marked by deep deposition of the Paleogene sediment cap, which exceeds 5,000 meters in some cases. Their dimensions reach 10-15x3-5 kilometers.

The South Fergana zone is hypsometrically more uplifted with respect to the surface of the Paleogene sediments (from -2.8 kilometers to +1.2 kilometers), and it is marked by diverse and complicated structure. This is a comparatively narrow (no more than 20-25 kilometers) strip of Mesozoic-Cenozoic deposits that has been submerged, often with an emergence on the ancient surfaces of Paleozoic rocks, with the active manifestation and wide development of rupture dislocations, which are differentiated by alternating structural elements (ridges, uplifts, troughs, monoclines, and others) and by sharp variability of the lithofacies and thickness of the rock complexes that form the cap of the sediments (see figures 1 and 2). This region has been more widely studied by drilling. Eight small fields of oil have been found here in Paleogene sediments.

Two benches (segments) are singled out in the South Fergana structural zone: the Togap-Guzan in the north and the Tashravat-Lyakkan in the south, divided by the Karatau and Guzan disjunctives. Within the Togap-Guzan bench, several latitudinally elongated lines of anticlinal folds which are marked by small sizes (2-2.5x0.5-0.7 kilometers) and asymmetrical structure are singled out here: the relatively gently sloping northern wing and the steep and sometimes overthrusted southern wing. The depth of deposition of the Paleogene in the arch parts of the structures varies from several hundred meters to 2,000 meters. Exceptions are the folds of the Shorsuy group, where the Paleogene sediments emerge at the surface.

Within the Tashravat-Lyakkan segment some local structures have been found by seismic exploration. Their dimensions are 3-8x1.5-2 kilometers, with an amplitude of 150-200 meters. The depth of deposition of the Paleogene sediments in their arches do not exceed several hundred meters. In the central part of the Lyakkan structure, the Paleogene sediments emerge at the surface.

Thus, the structural map, which was made up for the surface of the Paleogene complex, which promises to bear oil and gas, gives important information about the area's structure, the hypsometry of the surface, and the depths of deposition of the main productive strata for areas that still have not been drilled over, as well as the tectonic structural relationships of the various structural lines and elements, which will increase the reliability of planning prospecting for oil and gas.

In the Western Fergana about 40 structures that promise to bear oil and gas are known that have not been evaluated by drilling. Judging by the results of preceding years, the factors for confirmability of structures and for successfulness in drilling in the West Fergana is 0,5, and one can predict here the discovery of at least 10 oilfields and a corresponding increase in reserves.

As a first-priority region for prospecting for new fields, the Central tectonic structural zone must be singled out. It possesses the necessary inventory of promising structures, within whose borders the depths of deposition

of the main productive Paleogene stratum does not exceed 5 kilometers. The discovery here of new oilfields and an increase in reserves should be linked primarily with the Niyazbek-Makhram-Ravat region (where petroliferousness has already been established) and the promising Digmay-Kostakoz-Auchi-Kalachi region.

Of all the portions of the Northern tectonic-structural zone, the most promising for study by deep drilling is the Karamazar bench. Here the Paleogene sediments lie at depths of 4.0-4.2 kilometers, and the inventory of prepared structures includes three uplifts (the Benamoz, the West Supetay and the Kyzyldzhar) and several promising exposed structures. At all the other parts of the Northern zone, the Paleogene sediments are submerged to depths that exceed 5 kilometers, so they cannot be considered to be first priority.

In the Southern tectonic structural zone the inventory of promising structures has been almost exhausted. Further prospects for discovering new oil and gas deposits here in traps of the anticlinal type are limited. Additional reserves for searching for oil deposits in this zone, as well as, incidentally, in the other two zones, are associated with nonanticlinal traps of all types.

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STRUCTURE OF KALAMKASS FIELD'S JURASSIC HORIZON OIL AND GAS DEPOSITS

Moscow NEFTYANAYA PROMYSHLENNOST': SERIYA 'NEFTEGAZOVAYA GEOLOGIYA I GEOFIZIKA' (REFERATIVNYY NAUCHNO-TEKHNICHESKIY SBORNIK) in Russian No 10, Oct 83 pp 5-7

[Article by I. U. Muratov, K. Kh. Boranbayev, V. P. Kim, N. G. Khakimov and A. Ye. Dmitriyev (of Mangyshlakneft' [Mangyshlak Oil Production Administration])]

[Text] The Kalamkas, Karazhanbas, North Buzachi and Zhalgiztyubinsk fields are confined to the North Buzachi dome.

Sediments of Triassic, Jurassic and Cretaceous age make up part of the geological structure of the Kalamkas field. This field, according to the reflecting horizon U(?) is a brachyanticline that is stretched out in a longitudinal direction. The structure is complicated in its axial part by two domes--a central and an eastern one, which are outlined by an isohypse of -1,100 meters. At the northeastern pericline of the uplift a zone of loss of correlation, which is identified with a dislocation with a break in discontinuity, is singled out.

According to the drilling data, a conformity of the structural planes of the Cretaceous, the Jurassic and, probably, the Triassic, is observed. The brachyanticline is delineated along the roof of horizon Yu-I. Its dimensions are 26.0-x7.0 kilometers, amplitude about 100 meters. The dip angle of the northern wing is $1^{\circ}30'-2^{\circ}$, on the southern wing 1°. Small-amplitude tectonic dislocations, which divide the fold into seven blocks, are shown on structural maps of the productive Jurassic horizons. The western and eastern periclines of the uplift are marked by the greatest degree of dislocation.

In the cross-section of the Kalamkas field, six commercial gas-bearing formations are singled out in the Neocomian, two gas-bearing formations in the Aptian and seven productive horizons (Yu-I and Yu-VII) in Jurassic sediments. The gas and oil deposits are confined to the Yu-I and Yu-II horizons, and oil to the other horizons. The gas deposit of the Neocomian and the gas and oil deposits of the Yu-I horizon possess maximal productive area and height. The deposits belong to a bedded arch horizon that is screened tectonically, and in some cases they have lithological screening elements.

The productive series is represented in varying degrees by cemented sandstones, aleurites and clays.

The crudes of all the horizons are heavy (their density is 0.9-0.914 g/cm^3), and they contain 32.9 percent light oils (up to 300 degrees C), including gasoline cuts of 3.0-4.5 percent. The crude's viscosity at the surface is 92.9-266.1 sP, or 18.7-22 sP in the reservoir environment. The gas dissolved in the oil contains: methane 79.7-94.6 percent, ethane 3.3-12.7 percent, propane 0.6-3.4 percent, butane 1.0-2.5 percent and carbon dioxide--from traces to 0.9 percent.

The volumetric content of the gas in the gas caps and in the free gas are: methane 86.1-96.1 percent, ethane 0-0.35 percent, propane 0-0.30 percent, butane 0-0.2 percent and carbon dioxide 0.31 percent.

The crudes are highly resinous (up to 18.6 percent asphaltic and resinous substances) and sulfurous (the sulfur content is 1.5 percent), and the coke content is from 4 to 6 percent. The crude's paraffin content is low (less than 3 percent) and, because of this, the crudes are distinguished by low temperatures of congealment (-20 degrees C).

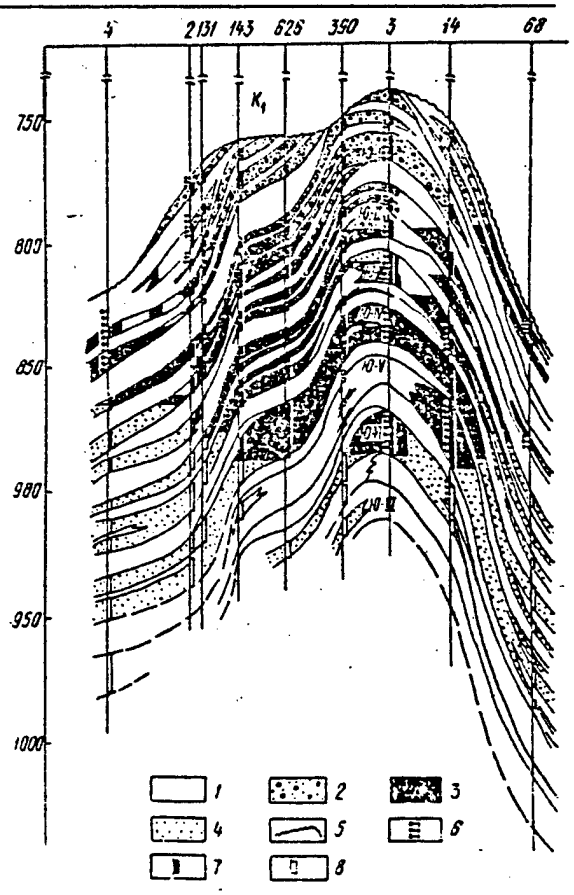
The crude's cut content during distillation is marked by a small amount of aromatic hydrocarbons (less than 6 percent) and a predominance of paraffin-naphthene hydrocarbons--93 percent.

The authors have made a breakdown of Jurassic productive horizons in the logs of the holes and of their correlation on the KS [apparent resistivity] and PS [spontaneous potential] curves, but, because of the unfavorable conditions for conducting the research (saline drilling muds and highly viscous oil), the effectiveness of using PS methods, micrologging, and microlateral, acoustic and caliper logging have proved to be low. The absence in the log of bench marks that are reliable and consistent by area and the nondifferentiation of PS curves have occasioned different methods for comparing the cross-sections of the holes. The authors have proposed a correlation variant that is distinct from the ordinary method, and, in so doing, the GK [gamma-ray logging] method has been used additionally for breaking down the cross-section.

The detection of a geophysical bench mark--a clayey subdivision between the Yu-IV and Yu-V horizons in hole No 50--along the GK curves and the identification and the tracing thereof in holes 6, 8, 66, 23, 70, 71 and 77 have enabled the field's cross-section to be broken down with greater validity. Taking into account the data of the production wells that were drilled in block IV of the field, a scheme for correlation of the Jurassic horizons was carried out along the line of holes 2, 382, 137, 130, 136, 380, 3, 135, 379, 115, 14 and 68, which intersect the structure's dome in a transverse direction. In a scheme that was compiled with the use of KS curves, caliper logs and GK, the bench marks, which were confined to the interface between the Yu-I and Yu-IV horizons, are singled out with precision. This has enabled the Yu-I, Yu-II, Yu-III, Yu-IV and other productive horizons to be singled out in the logs of the holes and to be traced throughout the area, and an increase in thickness of the sediments that are confined between the Yu-I horizon and the erosion surface of the Jurassic sediments to be fixed with confidence.

This has provided a basis for singling out in this series four stratigraphic deposits that previously had been attributed to the Yu-I and Yu-II horizons in the log of hole No 2. It was proposed that the deposits found, unlike the sheet deposits in the Jurassic and Cretaceous, be indexed from bottom to top as S-I, S-II, S-III and S-IV. The S-IV and S-III deposits were singled out in holes 2, 382 and 137, which were drilled in the southern wing of the structure. The lower-lying stratigraphic horizons gradually fade away along the up-dip of the logs of the holes until they completely disappear. A similar structure of deposits is also observed in other parts of the field.

Based upon the new correlation, a geological profile (drawing) and structural map were constructed for the cap of the Yu-III horizon. The Kalamkas field is a brachyanticlinal fold of latitudinal strike. Its dimensions are 27.5x7.0 kilometers and its amplitude is 150 meters at the isohypse contour of -950 meters. The dip angles are 4 degrees on the northern wing, 3 degrees on the southern. The fold is complicated by two arches--western and central, which are delineated by the seismoisohypse -860 meters. In comparing the structural map made up from drilling data with one made up in accordance with reflecting horizon U(?), various deviations are noted (where there is similarity of the main features of the geological structure). Thus, for example, the central arch is expanded in the western, northern and eastern directions, reaching 12 kilometers on the long axis and 3.7 kilometers on the short one, and it is complicated by local small-amplitude uplifts.



Kalamkas. Geological Cross-Section Along the Line of Holes 4, 2, 131, 143, 626, 390, 3, 14 and 68.

Key:

1. Clay.

Sandstones:

2. Gas-bearing,
3. Oil-bearing, and
4. Water-bearing.

5. Erosion surface.
6. Perforation intervals.
7. Productive formations.
8. Water-bearing formations.

The eastern arch has not been reflected on the structural map for the the Yu-III horizon. The western arch has an insignificant spread in terms of area. Its dimensions are 3.5x1.5, and its amplitude is 15 meters.

As is apparent from the geological profile (see the figure), in which each collector formation has been identified and traced and the results of the processing of oilfield geophysical data and of the sampling of exploratory holes and production wells have been systematized and analyzed, based upon the new correlation of Jurassic productive horizons, the oil and gas deposits are categorized as anticlinal sheet deposits, which are complicated in various sections by a lithological screen. Most consistent and lithologically homogeneous is the Yu-IV horizon, which contains an oil deposit with a VNK [oil-water contact] at the -887.5 meter level. The Yu-V horizon is the one that is most varied in lithological content. On the northern wing it is a thick (up to 26 meters) homogeneous formation that contains an oil deposit with a VNK at the -892 meter level, and on the southern wing it contains sandy lenses which are replaced in the structure's arch by clay rocks.

In light of the new correlation it should be considered that the stratigraphically screened deposits that have been revealed should be considered to be underexplored.

The data correspond to 05.03.N1.

11409
CSO: 1822/74

NUCLEAR POWER

VIGNETTES OF CEMA NUCLEAR-POWER CONSTRUCTION PRESENTED

Moscow PRAVDA in Russian 13 Jun 83 p 4

[Article: "Collaboration"]

[Text] Council of Economic Mutual Assistance member countries are implementing a most huge power program--the construction of nuclear electric-power stations with a total capacity of 37 million kW, based upon collaboration. Moreover, a great number of large AES's, including the Khmel'nitskaya and Yuzhnoukrainskaya, with capacities of 4 million kW each, are being erected. A large portion of the electricity from these AES's will be sent to fraternal countries. A solid basis has been laid for the construction of CEMA electric-power stations--large-scale cooperation in the production of equipment that has no counterpart in international practice has been arranged and specialized capacity has been created. Realization of the program for building AES's is of great economic and political importance, and it demonstrates in practice an indisputable advantage of socialism.

The Industry Is Gathering Strength--Nuclear-Power Machinebuilding in Czechoslovakia

According to a decision of the 16th KPCh [Communist Party of Czechoslovakia] Congress, the generation of electric power at Czechoslovakia's nuclear stations should reach 15 billion kWh in 1985. In determining the general direction of development of the power industry, specialists came to the conclusion that further construction of thermal electric-power stations in Czechoslovakia is desirable. Czechoslovakia has limited coal reserves. It does not have free hydroelectric resources at its disposal. A firm policy of developing nuclear power was adopted.

The first industrial nuclear electric-power station in the CSSR [Czechoslovak Socialist Republic], with a capacity of 880 mW, went into operation in 1980. It was built in accordance with a Soviet design, with our country's engineering cooperation. During the first four months of this year this station generated 2,350 million kWh of electricity, enabling about a million tons of coal to be saved.

This station's experience is being used widely in the erection of the AES V-2 Bogunitse. It will be somewhat different from the firstling of Czechoslovakia's nuclear-power engineering. The latest achievements of science and technology were considered in its design. The first unit of this AES, with a capacity of 440,000 kW, should go into operation at the end of this year. And next year the second power unit of the AES V-2 Bogunitse should yield current.

Construction of a nuclear power station at Dukovany is going on full blast. Its design capacity will be 1.76 million kW. The station will produce its first current in the summer of next year. In 1986 its construction should be completed. Preparations are going on for the erection of AES's at Mokhovetse and Temeline. At the Temeline station the CSSR will for the first time operate units of 1 million kW each. All of Czechoslovakia's AES's are being erected in accordance with Soviet engineering designs.

In 1980 a program for nuclear-power development up to 1990 was signed between the USSR and the CSSR. It has great significance for all socialist collaboration. Relying upon scientific and technical collaboration with the Soviet Union, Czechoslovakia has created a new branch of the national economy--nuclear-power machinebuilding. While the first AES at Yaslovske-Bogunitse was outfitted completely with Soviet equipment, Czechoslovakia will now produce the main part of it herself.

The republic's industry has in a short time mastered the output of nuclear reactors and special fittings. Capacity for this purpose has been reequipped or newly built at several large enterprises. According to the specialists' evaluations, equipment produced in the CSSR is of high quality and reliability. Power stations not only in Czechoslovakia but also stations in Hungary, the Soviet Union and other fraternal countries will be equipped with it. Reactors of 440,000 kW capacity are still being produced here. In 1987 Skoda plans to produce the first million-kW unit. Scientific and technical collaboration broad in scale is going on between the Soviet Union and Czechoslovakia at this station.

--S. Vtorushin (Prague)

The First Cuban Nuclear-Electric-Power Station--the Electric-Power Station at Juragya Will Give Current in 1987

It is more than 100 hectares of rocky land burned out by the tropical sun. On one side is the shore of the Caribbean Sea--and on the other is a paved road, and beyond that is a jute plantation. This is what the construction site set aside for Cuba's first nuclear electric-power station at Juragya settlement, not far from Cienfuegos, looks like. In accordance with an intergovernment agreement on economic and technical collaboration, since 17 April 1981 the Soviet Union has been extending assistance in the erection of this huge facility of Cuban power-engineering--an AES of 850 mW capacity.

"Today the main efforts are being concentrated on erecting the buildings for the station itself," says V. Trofimenko, chairman of the All-Union Association Atomenergoeksport [Association for the Export and Import of Nuclear-Power Plants and Equipment]. "It is not for nothing that four-fifths of the annual

volume of construction and installing work is concentrated on erection of the AES's basic facilities. The first power unit is to be started up in 1987, the second one 2 years later.

Soviet specialists are toiling together with 3,000 Cuban builders. Right now there are 70 of them, but in time the group's manning will increase. It is to help our friends to install the operating equipment, train personnel and do the startup and setting-up work. Collaboration is required also in assimilating the high-powered construction and installing equipment, which will start to arrive from the USSR this year.

A special dock is being erected for the reception of heavy, large-dimension cargo--reactor vessels, steam generators, turbogenerators and much other equipment. Another facility also connected with the nuclear power station and its future is already in operation: this is the industry's first training center, whose building crowns a picturesque cone-shaped hill at the entrance to Cienfuegos Bay. Personnel of the middle element for the construction and operation of the AES are being trained here.

The Communist Party of Cuba's Central Committee and the republic's government are paying great attention to the construction project at Juragya. The AES on the shore of the Caribbean Sea is called upon to become an important link in the country's unified power-engineering system. It is estimated that one reactor alone will replace a thermal electric-power station that would require 750,000 tons of petroleum product per year.

--P. Bogomolov (Havana)

Briefly

• In June 1954 the world's first AES gave current in Moscow's suburban city of Obninsk. The GDR became the second socialist country where nuclear electric power was obtained. In 1966 operation of the Rheinsberg AES began.

• According to MAGATE [International Atomic-Energy Agency] data, 281 nuclear reactors with a capacity of 161,000 mW are now generating 10 percent of the world's electricity. It is expected that by 1990 the world's AES capacity will reach 450,000 mW and, by the year 2000, about 700,000 mW.

• About 150 grams of uranium are spent generating 1 million kWh at the Novovoronezhskaya AES. This is equivalent to 360 tons of standard fuel equivalent. A year's consumption of nuclear fuel at such a station is only a few tens of tons.

• The development of nuclear-power machinebuilding is one of the areas of close, mutually advantageous cooperation of socialist states. This includes more than 50 plants and associations of Bulgaria, Hungary, the GDR, Poland, Romania, the Soviet Union and Czechoslovakia, as well as Yugoslavia.

Socialism's Energy--the Collaboration of CEMA Member Countries in Nuclear Power in the Modern Era

In recent years CEMA nations have been paying great attention to improving the structure of the production and the consumption of fuel-and-power resources and to their rational and economical use. This has been reflected in the Long-Term Specific-Purpose Program of Collaboration (DTsPS) for providing fraternal states with the basic types of energy, fuel and raw materials. Nuclear power has been given an important place in the DTsPS. Typical features of this mutual action are the coordinated determination of the scale of AES erection, the uniformity of reactor installations, the centralized supply of fuel, specialization and cooperation in the production of equipment, and joint solution of various problems of the burn-out cycle.

The general agreement on "The Development of Association Electric-Power Systems During the Period up to 1990," which was signed in 1977, serves as the basis for CEMA country collaboration in the area of nuclear power. The AES construction program over such a lengthy period also required a basic solution concerning the nuclear-power machinebuilding base. For this purpose, an agreement on multilateral international specialization and cooperation in the production and mutual deliveries of equipment for AES's for this same period--up to 1990--was signed in 1979.

Prior to signing this document, CEMA countries studied the new technology, which was based upon Soviet engineering documentation, the production of special steels and materials was organized, and cooperation in the deliveries of complete sets of components and parts was arranged. Simultaneously, new enterprises were built and tens of existing ones were modernized.

The Soviets' large Atommash Plant imeni L. I. Brezhnev, which has already undertaken to produce reactor plants and the basic equipment for the first circuit, occupies a prominent place in the newly created capacity. In Czechoslovakia specialized departments have been established in the Skoda Association and at the Vitkovitsa Machinebuilding and Metallurgical Plant. In Hungary, departments have been rebuilt to produce reloading machinery at Gants-MAVAG [Magyar Allami Vagon-, Acel- es Gepgyar Plant]. In Poland, a department for the manufacture of pressure compensators and steam generators has been built at the Rafako Plant and a department that produces heat exchangers has been modernized at the Fakon Plant. A number of facilities have been turned over for operation at enterprises of other countries that are party to the agreement.

Mastery of these matters, which are new for the fraternal countries' industry, required the solution of complicated industrial tasks that are associated with the more rigid demands made for equipment quality and reliability. The cooperation of Soviet organizations helped to solve these problems successfully. Practical help was extended in the preparation of operating technical documentation and in assimilating the technology.

All this basically enabled CEMA member countries to master by 1980 the whole range of specialized operating equipment for AES's with VVER-440's [440,000-kW water-cooled water-moderated power reactors]. Since then, the

nuclear power stations that have been under construction have been supplied with equipment for biological protection from the People's Republic of Bulgaria, for special water treatment from the Hungarian People's Republic, for heat exchangers from the Polish People's Republic, for reactors, volume compensators and main circulation pipelines, as well as main shut-off valves and steam separator-superheaters, from the Czechoslovak Socialist Republic, and for collectors, pipelines and steam separators for RBMK-type reactors from the Socialist Republic of Yugoslavia. It is recognized as desirable that overall coordination of collaboration of the participating countries and systematic monitoring of progress in fulfillment of the commitments they have adopted be entrusted to an intergovernment commission at the deputy chief of government level. At the commission's conferences, a regular exchange of information occurs, and measures aimed at fulfilling commitments for the manufacture and delivery of equipment for AES's are planned. The commission also discusses questions associated with the creation of new capacity, with providing technical documentation for the equipment being produced, with developing price lists, and with the introduction of various revisions in the products list and the amounts of production and dates of mutual deliveries.

As a result of the collective measures taken, nuclear power engineering is being developed in socialist countries on their own foundations, and they do not depend upon the capitalist market.

At present, nuclear electric-power stations with a total capacity of more than 22 million kW are at work in CMEA nations (versus 9 million kW in 1977), including 1.76 million kW in the People's Republic of Bulgaria, 440,000 kW in the Hungarian People's Republic, 1.83 million kW in the GDR, and 880,000 kW in the Czechoslovak Socialist Republic. The AES's of the CEMA member countries generated in 1982 more than 123 billion kWh of electricity. There were another 36 units with a total capacity of about 23 million kW (not counting the USSR) in the coordination, design and construction stages.

It is expected that in the next 10 years total AES capacity of CEMA member countries will reach the 100-million kW level. According to evaluations, by 1990 nuclear power's share will be 15-30 percent in various fraternal countries and more than 40 percent in Bulgaria.

The AES construction up to 1990 that the CEMA states have adopted has required a further deepening of multilateral scientific and technical collaboration in the nuclear power area. For this purpose, agreements were signed in 1980 about the conduct of scientific-research and experimental design development for the mastery of power units of 1 million kW capacity each, and about the development of high-capacity reactor plants based on breeders. Organizations of Bulgaria, Hungary, the GDR, the Republic of Cuba, Poland, Romania, the USSR and Czechoslovakia, and, on certain topics--collectives of Yugoslavia and the international economic association Interatomenergo--are taking part in this work.

The experience in international economic, scientific and technical collaboration in the area of nuclear power testifies to the great vital strength of socialist internationalism, to the multiplication of forces when they are united for the solution of major national economic problems.

--A. Troitskiy, Chief of USSR Gosplan's Power and Electrification Section

A City on the Goryn

We are ascending the 20-meter height of the future reactor along an iron staircase whose steepness reminds one of a ship's ladder. It will become the first power unit with a capacity of 1 million kW and, altogether, the design calls for 4 of them. A bit farther the foundation pit for the second "millioner" is already visible.

"Right now we are under the place where the nuclear pile is to be built," says A. G. Rozdobud'ko, secretary of the Slavuta City Party Committee. "It is here, in this building, that the reactor vessel will be placed, into which the fuel elements, which externally resemble ordinary pencils, will be loaded."

The secretary names figures by heart: how many cubic meters of concrete have been laid, the amount of earthmoving work, and the cost of the various facilities. The thick concrete walls, the steel air-tight doors and rebars which you see around, apparently embody visibly all these data....

Aleksey Raguzin's brigade is working on construction of the first power unit. Not long ago this collective brought about socialist competition with the Polish brigade of Khenrik Matras.

"They are alongside here," A. G. Rozdobud'ko points out the direction of a long structure that has barely risen above grade level, with a tower crane hanging above it. "In addition to them, an agreement about labor rivalry has been concluded by two other brigades. They are working on construction of the housing settlement. These are the collectives of Vasiliy Tura and Tadeysh Barshch."

The Khmel'nitskaya AES is being erected by the joint efforts of the Soviet Union, Hungary, Poland and Czechoslovakia. According to the intergovernment agreement that was concluded in 1979, Hungary, Poland and Czechoslovakia will participate in the construction by sending various commodities, which will be above the annual agreements and will be paid for in accordance with existing practice. Moreover, a large detachment of specialists from Poland has been working at the Khmel'nitskaya AES. Polish workers and engineers are also doing certain work at the Kurskaya and Smolenskaya AES's on the shared-participation account for the erection of this nuclear power station.

Our country is furnishing the necessary documentation and material and financial resources, is doing construction and installing work at the AES's facilities, and, after introduction of the power units, will undertake to operate the station and to supply it with nuclear fuel.

The amount of power that each country will receive is directly proportional to its contribution to construction. After introduction into operation of the first unit of the Khmel'nitskaya AES and of the appropriate electric transmission lines, the USSR will for 20 years insure the delivery of power, the annual amount of which will, by 1990, be 2.4 billion kWh for Hungary, 6 billion kWh for Poland, and 3.6 billion kWh for Czechoslovakia. This is the same as if Hungary had built its own station of 400,000 kW capacity, Poland one of 1 million kW capacity, and Czechoslovakia an AES of 600,000 kW capacity.

"We well understand the significance of this station on the Goryn River for all the countries concerned, particularly Poland," says secretary of the PORP [Polish United Workers' Party] organization at the construction project Yan Stanishevskiy. "We are working with all our might. Besides the special building, we are building dining halls, a kindergarten, a dormitory, a department store and a vocational and technical school, and we are laying utility and service lines."

This year Polish specialists should assimilate 12 million rubles. In 1984 this figure will grow to 18 million rubles. The plan for last year was set at 7.3 million rubles. Successful fulfillment of the strenuous program relies upon high-quality work. At the PORP organization we were told the names of the best workers--carpenters Eduard Chizhevskiy and Marian Sklodovskiy, assembler-mechanic Tadeysh Litva, concreter Aloyzi Trushchinskiy, mason Chaslav Marchinyak, reinforcement worker Yevgeniush Karach, and many others. We are expecting that the sccialist competition between Soviet and Polish workers that is being promoted will hasten the pace of the work, raise its quality and, of course, introduce new names on the roster of the right-flankers.

I became acquainted with Stanislav Shelest, foreman of a section, during construction of the special building. Although he has even acquired a dense auburn beard here, he clearly was not "showing" his 37 years. Yet he has been a builder for 17 years.

"Nevertheless my Soviet colleagues have taught me something," he says. "The quality of the work is high, not to mention the scale, which is unusual. This is the first time I've been on such a job. True, we also show them something. So it is that it is beneficial--mutually...."

The average age of the Polish builders is 30. Therefore, there is a special attitude toward organizing leisure for the young. In the temporary Polish housing settlement, a club and a cafe are operating, discoteks are being held, excursions are being conducted, courses in the Russian language have been organized, and there is a library. Soviet and Polish holidays are observed jointly. The Polish friends often have Soviet professional and amateur artists as guests. And "international" football and volleyball matches at times attract more spectators than any matches of masters. Also, so-called "family" evenings are often held here, when workers of the two countries invite each other as guests to their homes.

Jan Stanishevskiy considers these meetings very useful.

"The establishment of personal ties," he said "is just as important as, let's say, the exchange of professional experience. In meeting not only on the job but also at home, the workers of the two fraternal countries necessarily find common interests."

Work in the common interest of the job deepens the friendship of the fraternal peoples.

11409
CSO: 1822/3

NON-NUCLEAR POWER

MINISTRY BLAMED FOR POWER PLANT CONSTRUCTION DELAYS

Moscow PRAVDA in Russian 12 Oct 83 p 2

[Article by correspondent S. Ryabov: "The Trust and the GRES"]

> [Text] Ural industry is developing dynamically. Quite naturally, it needs ever larger amounts of electric power. This is why a decision was made back in the 10th Five-Year Plan to build the Permskaya GRES with an output capacity of 4.8 million kilowatts. However, the schedule could not be met, and commissioning of the new power production capacities was postponed to the 11th Five Year Plan. The USSR Ministry of Power and Electricifcation planned at first to have the first generation of the power plant (three out of six blocks) operational by this year. Later on, the deadline was postponed to 1984. However, it is not fully certain that the builders will finish their work in time. Why?

N. Litvinov, chief of the administration responsible for construction of the Permskaya GRES, had apparently become accustomed to such questions a long time ago:

"We have to simultaneously erect housing and production facilities, and there are not enough workers. Thus before finishing work in one place, we are forced to move people to another 'hot spot.' Workers would have come to us here in Dobryanka, but there is not enough housing. And so we get a vicious circle."

For the sake of justice it should be noted that the ministry made substantial preparations for assimilation of the large capital investments (the estimated cost of just the first generation of the power plant is over half a billion rubles). A concrete slurry plant, reinforcement metal and woodworking shops and the production bases of subcontracting subdivisions have already been erected at the construction site. A residential microdistrict containing stores, children's nurseries and cafeterias has come into being on the outskirts of the city of Dobryanka, several kilometers from the complex. But this is not enough.

The directors of the construction project turned to the sector's headquarters with the following proposal: building twice as many homes as planned in 1982, and thus breaking the "viscious circle." One thing that could make this idea work was missing--prefabricated residential building structures. First Deputy Minister P. Falayeyev gave instructions to the "Kamgesstroy" and "Cheboksargesstroy" trusts to provide enough reinforced concrete articles to erect 19,000 square meters of living space. But the trusts sent only part of the highly needed parts to Dobryanka. A third supplier--the Verkhnyy Tagil Construction Structures Combine of the "Uralenergostroy" Trust, which is in Sverdlovsk Oblast, did send all of its products to Perm, but it did not do so until the end of the year. In short, the counterplan for residental construction fell through.

Now history is repeating itself. It is as if the breakdowns in the construction conveyor have been preprogrammed. The ministry sent the resources foreseen by the engineering plan for creating capacities producing parts for large-panel housing construction, carpentry articles and brick and for extraction of nonmetalliferous materials not to the construction site but rather to construction industry enterprises of the "Uralenergostroy" Trust in support of their development. The reasoning was that inasmuch as the Permskaya GRES construction administration is a subdivision of this trust, the latter is responsible for supplying its project with everything necessary.

The leaders of party and business organizations of the Kama presented logical arguments concerning the overloading of the railroads and the inefficiency of countercurrent freight flows in vain. Nothing helped. Moreover "Uralenergostroy" had not completed its entire volume of work aimed at expanding and rebuilding its own construction industry enterprises. This is why builders of the GRES are still experiencing an acute shortage of the most necessary articles.

Meanwhile equipment for the future station is already arriving at the construction site. There is no place to store it. Ventilation chambers and parts of the power production units are lying around on bare ground.

Incidentally this is the second year that the board of directors of the plant under construction has been sending messages to its suppliers with a rather unusual request: to postpone shipment of the manufactured equipment. The Glavvostokenergostroy [not further identified] and other associated main administrations were obligated to finish an area for storing and assembling structures and equipment back in June of last year. This issue was examined many times by the board of directors of the Ministry of Power and Electrification, and all to no avail.

Delve into the roots of the problems surrounding erection of the Permskaya GRES, and listen to the proposals of the brigade leaders and foremen as to how the situation could be improved, and you will be astounded by the helplessness and confusion suffered by the executives of the construction project, by their inability to counter the circumstances with progressive forms of labor organization , the engineer thought of specialists and the best

experience. Thus the brigade contract is not even a topic of discussion among the organizational and technical measures called upon to raise labor productivity.

"What is there to be astounded about?" foreman V. Golubayev said. "Last year all of the contracts fell through: First one thing is lacking, and then another. Were supply and the mutual relationships among associates in order, we might not even need additional people."

An integrated "workers relay" competition between associates did not get off the ground at the construction site either. Local problems are sometimes explained away by external difficulties. It may be said that the party committee of the Permskaya GRES Construction Administration is far away from the construction site both literally and figuratively: It is a rather long ride to the construction site. Nor did the party committee make the effort to sensibly organize visual agitation so that both the experience of the best workers and the negligence of certain businessmen could get their deserving evaluation.

Back in spring of last year the bureau of the Perm Oblast party committee thoroughly analyzed the state of affairs at this highly important Ural power project. Executives of the "Uralenergostroy" Trust, of Glavvostokenergostroy, of subcontracting organizations and, of course, of the construction administration itself promised to correct the situation. Serious remarks were addressed to the party committee of the construction project and to the Dobryanskiy Rayon party committee.

And now the year is behind us. Alas, no changes for the better have occurred. The labor productivity curve has dropped to the level of 5 years ago, and on the whole the annual quota in relation to construction volume is being satisfied to two-thirds in the best case. The trust often sends workers and equipment from here to other construction projects "of its own."

Is there a way that the builders of the GRES can break the "vicious circle" and get the first generation of the plant operating on schedule? This question would have to answered primarily by executives of the USSR Ministry of Power and Electrification. Minister N. Neporozhniy visited the construction site to witness the pouring of the plant's foundation. But it would be even more useful to make such a trip today. It is time for the sector headquarters to self-critically consider the situation in which the power project now finds itself, to analyze its woes and to take steps to see that the pulse of this important construction project would beat evenly and reliably.

11004
CSO: 1822/55

WAYS TO RAISE INSULATION STRENGTH OF HIGH VOLTAGE POWER LINES SOUGHT

Moscow IZVESTIYA in Russian 10 Oct 83 p 1

[Article by correspondent A. Illarionov: "How to Subjugate Lightning"]

[Text] A dry intermittent crackling can be heard at the outskirts of Novosibirsk at the onset of night. Eerie blue and violet lights wander over invisible wires. An explosion--and the air is cleaved by an enormous spark.

V. Bushuyev, director of the Siberian Scientific Research Institute of Power Engineering, says that in nature, a lightning bolt pierces an air layer several kilometers thick. But here, at the country's most powerful high voltage testing complex, the length of an electric discharge in air is just a dozen or so meters for the time being. But the voltages of natural and artificially elicited lightning are becoming comparable: They differ by only a factor of two or three.

Mankind has observed lightning throughout its long history, but it has never produced a conclusive theory of electric discharages. We were able to live with that as long as interest in lightning was purely scientific.

Today, at a time when the power and intensity of electric power transmission lines is growing, electricity is transforming into a destructive force--it is rupturing insulation. A way to bridle this power is being sought. I walked into a reinforced concrete cubicle together with Eduard Yanshin, director of the high voltage electrophysics sector. The thunder and snaking lightning seemed unusual (there was no echo) in the dark room.

Strictly speaking, all we see is the glowing ionized trace of an electric discharge. To study artificial lightning, it had to be "frozen," as they put it here. An instrument that made it possible to photograph lightning at different stages of its movement helped Yanshin and his comrades to do this.

How does a discharge behave itself in an electric power transmission line? Novosibirsk researchers were able to clarify a great deal. The following question arose during erection of a power transmission line of unprecedented voltage--1.15 million volts--between Ekibastus and the Urals: How could electric arcing be prevented between the conductor and the support when the voltage difference is up to 1.8 million volts? The institute's colleagues

conducted a number of experiments, and they were able to increase the dependability of insulation by 20-25 percent with minimum outlays.

It was said 20 years ago that creating an electric power transmission line carrying a million volts was science fiction. Today, specialists are seriously discussing power transmission lines of the future carrying close to 2 million volts! The design will be tested right here, at the Siberian Scientific Research Institute of Power Engineering. This is why a new generator with a pulse power of 7 million volts is being built at the testing complex.

11004
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NON-NUCLEAR POWER

BUILDING AT LITHUANIAN PUMPED-STORAGE POWER STATION PROGRESSING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jun 83 p 1

[Article by S. Borisova, USSR Minenergo [Ministry of Power and Electrification] Press Center Correspondent: "The GAES Gets a Start"]

> [Text] "Execute the construction...of pumped-storage electric-power stations in the European Part of the USSR," states the Main Directions for the Economic and Social Development of the USSR. The first industrial station of this type, as is well known, is being built in Moscow Oblast, at Zagorsk. And in Lithuania, on the shore of the Kaunass Sea, a second GAES [Pumped-Storage Electric-Power Station]--the Kayshyadorskaya, one of the largest construction projects of the five-year plan in the republic--is being erected.

The most feverish part of the construction project--the foundation pit for the GAES's building--is clearly visible from a high hill. Right now earthmoving work is going on: excavators are biting into the soil, bulldozers are scraping the bottom, and mighty KrAZ's [trucks made by the Kremenchug Motor-Vehicle Plant] and KamAZ's [trucks made by the Kama Motor-Vehicle Plant] crawl in a stream along the steep roads. All this is united in a start-to-finish mechanized excavating and transporting complex that is managed by experienced builder A. Sviglinskas. The complex at the construction project deservedly is called a shock-work complex. When the equipment operators and transport workers were charged with building a temporary canal for diversion of the Streva River, they coped with the task on time and overfulfilled the plan by 170 percent.

The builders have a strenuous program this year: they are to displace more than 2 million cubic meters of soil and to protect the foundation pit from water by means of a water-drawdown system--for the pit is 36 meters below sea level. The established construction periods are short: the first concrete for the GAES building is to be laid this year.

Let us recall in a couple of words just what a pumped-storage electric-power station is and why one is needed. In the long term, power consumption in the European part of the country is expected to increase 1.5-fold. But the consumption of electricity is a value that sharply changes during the day. The high-capacity nuclear-power station units being built in this region are, as the power workers say, inflexible: they must not be started and stopped

frequently, lest wear of the equipment be speeded up. Therefore, because of the introduction of a new AES, which has units with large individual capacities (a million or a million and a half kilowatts), it becomes necessary to build such special flexible power stations as GAES's, which serve as singular storehouses of energy.

"Two and four-tenths of a billion kilowatt-hours per year--this is the increment that the Kayshyadorskaya station's eight units will deliver to the Unified Power System of the country's northwest," says Litovglavenergo [Lithuanian SSR Main Administration for Power Management] manager Yu. Nekrashas. "The costs of erecting it will be repaid in less than 3 years. When the GAES is put into operation, the reliability of the power system's operation will be increased. About half a million tons of standard fuel equivalent per year will be saved."

We are standing with deputy chief engineer Vatslav Spudulis on the edge of a bluff, from which the pile field descends downward, in steps. This, perhaps, is the part of the construction that is most complicated from the standpoint of technology. The pressure pipe that will connect the upper basin with the station's units--8 "strands" each 80 meters long--will pass over it. The weight of one running meter of such a strand exceeds 80 tons. In order to provide reliable support for it on the ground, the design calls for drilling for about 1,500 cast-in-place piles up to 25 meters deep each. It is planned to prepare 260 piles this year. The drillers, under the supervision of V. Udot, are working ahead of schedule.

The builders of the Kayshyadorskaya GAES have adopted increased commitments for this year. A rivalry has now been promoted among all elements of the almost 2,000 collectives for the right to lay the first cubic meter at the hydropower station. The Kayshyadoris power builders are competing with the builders of the Zagorskaya GAES.

It is planned to start up the first unit of 200,000 kW capacity next year. And the following year, the last year of the five-year plan, three more units will start to operate.

11409
CSO: 1822/29

NON-NUCLEAR POWER

LARGE UKRAINIAN PUMPED-STORAGE POWER STATION IN DESIGN STAGE

Moscow SOVETSKAYA MOLODEZH' in Russian 13 Aug 83 p 3

[Article by N. Nesvitenko (APN [Novosti Press Agency] correspondent): "A Design Is Being Developed"]

[Text] The design for the Kanevskaya Pumped-Storage Electric-Power Station (GAES) of 3.6 million kW capacity is being developed in the Ukrainian Division of Giproproyekt [All-Union Design-Survey and Scientific-Research Institute S. Ya. Zhuk]. It is proposed to install there 18 reversible hydropower units, that is, units that can operate both as a pump and as a turbine. This station will operate 14-16 hours per day during peak and semipeak loads on the power system.

The station's upper reservoir will be built to use ravines and gullies, fenced off by dams and levees. The existing reservoir of the Kanevskaya Hydroelectric-Power Station will become the lower basin.

The Kanevskaya GAES will enable 2 million tons of fuel to be saved each year--the fuel that would have been consumed in generating the same amount of electricity at thermal power stations.

The construction of pumped-storage power stations is promising. They provide for effective and reliable operation of power systems.

The electrical load of power systems is uneven during the day. At night it is two-thirds of the daytime maximum, and on some days it is half. Such drops create considerable difficulties in the operation of large power units at thermal and nuclear power stations, which operate more economically under a steady load. Startup and stopping of power units with such load changes lead to great overexpenditure of fuel, increase wear on the equipment and expenditures for repairing it, and so on.

That is why flexible pumped-storage electric-power stations, which can use the excess night capacity to generate electricity for consumption during the peak hours, are necessary. They thereby enable improvement in the operation of thermal and nuclear electric-power stations. Moreover, the GAES reservoir can be used for irrigating land and for fisheries.

Pumped-storage power stations operate in two modes--pump and turbine. At night, when the demand for electricity drops, these stations are "charged": their units, acting as pumps, transfer water from the lower basin into the upper one. In the morning and evening, during the maximum load on the power system, the GAES generates electricity: water from the upper basin drops on the turbines' blades. So the flexible pumped-storage power system smooths out the load on the power system, serving as a source of additional electricity during the peak hours.

The country's first pumped-storage station--the Kiev (225,000 kW)--went into operation in 1970. It works in unison with the Kiev hydropower station.

The Zagorskaya near Moscow (1.2 million kW) and the Kayshyadorskaya (1.6 million kW) are now being erected.

Large power complexes that combine the operation of nuclear and pumped-storage power stations are to be built. The first such complex--the Yuzhno-Ukrainskaya--is under construction. Its capacity will exceed 6 million kW.

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NON-NUCLEAR POWER

BASHKIRIA'S HEAT-POWER CENTRALS FALL SHORT IN GENERATING ELECTRICITY

Moscow PRAVDA in Russian 17 Sep 83 p 2

[Article by Sh. Abdurashitov, manager of Bashkirenergo [Bashkir Regional Electric-Power Management Administration] and V. Migunov, deputy chief of the Industrial Section of the Bashkir CPSU Oblast Committee: "For Each Kilowatt"]

> [Text] Each year the power workers introduce new capacity at the country's electric-power stations. But the growth in consumption of electricity in branches of the national economy is still outracing the generation of it, and the imbalance is often adjusted--by switching customers off. At the same time, an analysis of the operation of some electric-power stations indicates that they are not always being used at full capacity.

The total capacity of the electric-power stations located in Bashkiria is more than 5 million kW. But how is the fixed capital being used? Computations indicate that actually the electric-power stations' load seldom exceeds 4.2 million kW.

What are the causes of this situation? More than 60 percent of the capacity is concentrated at heat and electric-power centrals (TETs's), at which the paramount task is the generation of heat and the generation of electricity is apparently second priority. Such an approach to the use of TETs's over a period of decades has also formulated the specifics of their design, when, for the sake of cheaper construction here, they do not call for reserve boiler installations, and the expenditure of cooling water has not always been designed for the full electrical capacity.

Therefore, during the winter, as a rule there is not enough steam for a full load on the turbines, while in the summer, when there is a surplus of it, the small-capacity cooling towers do not cope with their functions of cooling the water. Thus, the TETs's are "underused" practically the year around.

Can each kilowatt be put to use? Absolutely! This year, for example, at the Sterlitamak TETs, a reserve boiler will be introduced. This will allow the power station to raise the maximum load in the winter by 50,000 kW. The costs are relatively small--3½ million rubles. Two cooling towers will suffice to increase the electric-power station's capacity by 60,000-80,000 kW during the summer.

It is estimated that, with the installation of 6 boilers and 10 cooling towers at Bashkirenergo heat and electric-power centrals, it will be possible to increase the electrical capacity by half a million kilowatts. The cost will not be more than 30 million rubles. Such an increment could be obtained by erecting new electric-power stations only by investing severalfold more funds.

Let us pay attention also to another important detail. This yield of TETs equipment does not involve growth in numbers of personnel or the development of external power grids and other infrastructure elements. Bringing electric power stations to their rated operation will yield a genuine increase in labor productivity.

Bashkirenergo is at present making design studies whose purpose is to eliminate the gap between the rated and the actual capacity at the disposal of the TETs of the Bashkir Biochemical Combine, the thre Ufa TETs's, and the Kumertauskaya and Salavatskaya TETs's. However, this work is proceeding slowly and it does not always get support from the main administration and the ministry. Therefore it is taking years to go from design to realization.

The decision to build an 11th boiler at the Sterlitamak TETs, for example, was adopted by USSR Gosplan almost 10 years ago. However, the USSR Ministry of Power and Electrification has not for a long time resolved the problems of design and financing in the required amounts. The construction of such facilities, as a rule, experiences increased difficulties in getting outfitted with auxiliary and special boilerhouse equipment and constructional structure. And the cause is simple. Their introduction into operation does not add a single kilowatt to the books.

Difficulties in bringing heat and electric-power centrals to design capacity also arise as a result of the fact that, in most cases, equipment of small unit capacity has been installed at them.

Personnel of the electric-power stations have been more interested in specific fuel consumption than in increasing energy output. Such is the system of material incentives. This superimposes its own difficulties on bringing heat and electric-power centrals up to design capacity. Therefore, reserves at medium-size and small TETs units go unused.

In our view, until the shortage of generating capacity is eliminated, it will be impossible to single out units as economical and uneconomical. USSR Gosplan, the State Committee on Science and Technology and USSR Minenergo must make the adjustments to this question that are dictated by the existing situation.

It would seem that the systems for paying wages and awarding bonuses should stimulate primarily the maximum production of electricity and a power station's readiness to carry its rated capacity, regardless of the structure of the combined output of electricity and heat energy.

There is another important reserve for achieving a balance in electrical consumption. The time has come to regularize the system for issuing authorizations for the right to use electricity. For the release of heat, where the

supplier and the customer have a fixed relationship, everything has been regulated clearly and with precision. Prior to obtaining heat output, the customer should expand the source's productivity, regardless of the agency to which it is assigned, by the required value, or transfer funds to the possessor for these purposes--first, of course, having obtained USSR Gosplan authorization for consumption of the fuel. Regulation of the release of electricity to customers is "farmed out" to power systems and is governed only by the capability of the power grid to carry the various power streams.

Thus demand for electricity, far from conforming with the power workers' capabilities, is now growing at an outstripping pace. A paradox occurs: the existing production potential often suffers from a deficiency of electricity, but practically free access, which is limited in no way, is opened up for newly formed enterprises and organizations.

We are convinced that the nationwide power grid should increase proportionally both to the incoming and the outgoing portions of its balance. USSR Gosplan and the country's Ministry of Power and Electrification must establish stricter monitoring over this.

A businesslike approach to the matter and the uncovering of existing reserves at electric-power stations will enable the national economy to be provided with electricity reliably, without interruption.

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BRIEFS

SUPPORT FROM GAS TURBINES--New gas turbines with an output capacity of 150,000 kilowatts, the manufacturing plans of which have been drawn up by designers of the "Leningradskiy Metallicheskiy Zavod" Association, will help to sharply increase the supply of electric power to consumers in peak hours, when the load on the power system rises quickly. Preparations have been started at the enterprise for production of these machines, which can reach their total planned output capacity within about 40 minutes and which are characterized by high efficiency. "Now that the power-to-worker ratio in industry and agricultural production is increasing, and that the number of electric appliances possessed by the population is rising, the daily pattern of consumption of electric power is destabilizing more and more," said the association's acting chief designer of gas turbines K. V. Stolbov. "The demand for it at peak hours exceeds the average by almost a third. Expansion of the network of hydroelectric power plants, which are supposed to cover such peak loads in the European part of the country, is difficult owing to the almost complete exhaustion of the available hydroelectric power resources. This is why we have now assumed the course of building gas turbine electric power plants for these purposes. Concurrently, to cover the peak loads, we are building water and air storage electric power plants, and we are connecting subsystems within the country's unified power system with top-class electric power transmission lines in order to transfer energy from regions where it is night to regions where consumption is higher at the particular time." [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 20 Sep 83 p 2] 11004

ARCTIC HYDROELECTRIC PLANT--Svetlorgorsk, Krasnoyarsk Kray--The first cubic meter of concrete was poured for the foundation of the world's northernmost hydroelectric power plant--the Kureyskaya GES in the Arctic. Preparations for erection of the hydroelectric power plant in the harsh Arctic tundra on the River Kureyka began in 1975. The residential complexes of the new city of Svetlogorsk have already been built. An industrial base and a warehousing system have been built, erection of the dam from the right bank has been started, and the foundation for the future building of the hydroelectric power plan is being poured. An although the output capacity of the new plant will be relatively low--600,000 kilowatts, it should play a large role in assimilation of the wealth of the Yenisey north and the Norilsk industrial region. [Article by Yu. Yudin] [Text] [Moscow TRUD in Russian 23 Aug 83 p 1] 11004

BUILDERS' SETTLEMENT--Svetlogrosk, Krasnoyarsk Kray--Construction of a permanent settlement for power engineers and builders of the Kureyskaya GES has been started. A hospital complex, a post office and telegraph building and a store have been placed into operation. A personal services building and a gymnasium have been opened as well. Construction of the first permanent residential building is also under way. Meanwhile the 1,000 builders of the hydroelectric power plant and their families are living in a well-equipped temporary settlement amid furs and pines on the slope of Mount Svetlaya. Children's nurseries, schools and cultural and personal services enterprises are operating in this settlement. The hydroelectric power plant on the Kureyka will supply energy to the developing Norilsk industrial region. The dam is now being filled, a construction tunnel is being punched through solid rock, and the river's new channel is being cut. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Nov 83 p 4] 11004

HYDROELECTRIC POWER CAPACITY INCREASES--Khorezm Oblast--The third power block of the Tuyamuyunskaya GES has started producing industrial current. A new flow of cheap power produced by the waters of the Amu-Darya has now entered the Unified Central Asian Power System. The output capacity of this machine unit is the same as that of the first two--25,000 kilowatts. "It took only 3 weeks to install the third block, which is twice faster than for the previous blocks," said the operations chief for the hydraulic complex's structures R. Abdullayev. "Experience accumulated in starting up the first machine unit has had its affect. Laborers of enterprises and organizations of more than 40 of the country's cities made a great contribution to the success: They provided us with the equipment. Engineers from Leningrad, Sverdlovsk, Dushanbe and Takhiatash, who were highly experienced in electric power plant construction, labored hand in hand with the workers of the Tuyamuyunskaya GES." Having finished adjustment of the third machine unit, the builders of the Tuyamuyunskaya GES decided to commission yet another power block by the end of this year--a 25,000 kilowatt block. Their pledge is based on an agreement for cooperation between builders and the collectives of supplying enterprises, owing to which the equipment is already arriving from Leningrad ahead of schedule. Personnel are being trained for the Tuyamuyunskaya GES simultaneously as well. This week another group of men and women completed their training at kindred enterprises in the country, receiving specialties in operation of hydroelectric power plants. Now, in order to master the "secrets" of their profession, future workers of the station will not have to leave their native city: A power engineering department has been opened at the new vocational-technical school in the city of Druzhba. When construction of the "electricity factory" on the Amu-Darya is finished, its output capacity will reach 150,000 kilowatts. The reliability with which electric power is supplied to two fraternal republics--Uzbekistan and the Turkmen SSR--will rise. [by correspondent Yu. Ibragimov] [Text] [Tashkent PRAVDA VOSTOKA in Russian 26 Oct 83 p 1] 11004

NEW HYDROELECTRIC POWER PLANT--Tajik SSR--The first foundation stone of the future Sangtudinskaya GES--the seventh in the Vakhsh cascade of hydroelectric power plants--has been laid. The noise of machinery and the bustle of a large construction site can be witnessed upstream from the place where the building of the new hydroelectric power plant will rise: Work is at its peak at the

neighboring Baypazinskaya GES. Small by today's yardstick, the initial hydraulic engineering complex, the first in the republic, built in the 1960s, is doing its noisy work. Things are getting crowded on the Vakhsh. Specialists assert that every kilometer of this river, which has carved its way to the plains from the snowy summits and glaciers of Pamir, is three times "richer" in kilowatts than a kilometer of the Siberian giant Yenisey. In the future the Vakhsh will be able to support cascades of eight electric power plants with an average annual output capacity of 43-45 billion kilowatt-hours of electric power. The Sangtudinskaya GES, the second-to-last in the cascade, consists of two sites--an upper and a lower one--with a total output capacity of about a million kilowatts. The plant's reservoir will provide enough water to irrigate 20,000 hectares of arid land. Knowing the value of land in this mountainous region, the planners took care to minimize the area flooded by the reservoir. The first surveying peg has also been planted at the site of the future settlement of the hydraulic power plant builders. The Vakhsh cascade they are creating is the dependable power production part of the rapidly developing southern Tajik territorial-production complex. [by correspondent A. Kamanov] [Text] [Moscow KOMSOMOL'SKAYA PRAVDA in Russian 13 Oct 83 p 1] 11004

VOLGA POWER PLANT--Cheboksary--It has not even been 3 years since the Volga was dammed at the site of the Cheboksarskaya GES. The hydroelectric power plant builders learned a great deal since that time: The number of people now working on the main hydroelectric power facilities is almost half less than the amount that were working at the time of the launching of the first generation of the plant. A flow line method of work organization helped to make this happen. The pace of the construction project is climbing. Preparation of the zone to be flooded by the reservoir is proceeding at full steam. The builders are reinforcing its banks, they are covering steep banks with concrete and stone, and they are fitting out a quay at Cheboksary. The lights of the hydroelectric power plant, the final stage of the Volga power cascade, are growing ever brighter. It has already produced over 3.5 billion kilowatt-hours of electric power. By the end of the year another machine unit will go into operation. After all 18 power production units go to work, the station's output capacity will be 1.4 million kilowatts. The reliability of power supply to Volga cities and industrial enterprises and to construction projects in the nonchernozem zone will rise significantly. [Excerpts] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 5 Oct 83 p 1] 11004

SECOND SURGUT POWER PLANT--A second GRES is being erected in Surgut, one of the petroleum and gas extraction centers of the Tyumen North. The first power block of GRES-2, which will have an output capacity of 800,000 kilowatts, is to be placed into operation in the fourth year of the five-year plan. The GRES-2 is one of the most significant construction projects of West Siberia. It is the largest electric power plant in the country operating off of by-product gas extracted together with petroleum from rich petroleum and gas deposits of the middle reaches of the Ob. [Text] Frunze SOVETSKAYA KIRGIZIYA in Russian 26 Oct 83 p 2] 11004

POWER PRODUCTION PLAN SURPASSED--The republic's power engineers have produced their 7 billionth kilowatt-hour of electric power since the beginning of

the year. This includes 63 million kilowatt hours in excess of the plan. Faster production is owing to the dependability with which the equipment is working and the longer time it operates between repairs. The leader of the socialist competition is the collective of the Maryyskaya GRES imeni 50-Letiye SSSR, which completed the plan for 3 years of the five-year plan back in September, and which produced over 16 billion kilowatt-hours. It saved 40,000 tons of standard fuel units. This is enough to keep the republic's largest power plants operating for a week. The GRES will also be working on saved fuel on 15 October--the day of the all-union communist unpaid work day dedicated to the 25th anniversary of the movement for a communist attitude toward labor. [by A. Kar"yagdyyev] [Text] [Askhabad TURKMENSKAYA ISKRA in Russian 12 Oct 83 p 1] 11004

CENTRAL ASIAN POWER PLANT--Karshinskaya Steppe--Central Asia's largest state regional electric power plant, the Talimardzhanskaya GRES will be erected in southern Uzbekistan, near a reservoir of the same name, which now extends along the length of the famous mechanical irrigation canal bringing water from the Amu-Darya to the Karshinskaya Steppe. The output capacity of this power plant will be 3.2 million kilowatts, produced by four power blocks with capacities of 800,000 kilowatts each. A foundation pouring ceremony was held at the site of the new power plant. USSR Minister of Power and Electrification P. F. Neporozhniy spoke at the meeting. The plant's first block, the design of which is being developed by the Central Asian department of the All-Union Order of Lenin State Institute for the Planning of Electrical Equipment for Thermal Engineering Structures, is planned to become operational as early as in 1986. The collective of the "Uzbekgidroenergostroy" Trust adopted a pledge during the meeting--to beat even this deadline, utilizing the experience of peoples construction projects and the "workers relay" system. The first trailers of the builders have already appeared in the virgin territory. Natural gas will be the fuel used by the Talimardzhanskaya GRES. Deposits of gas have been discovered in direct proximity to the construction site--south-east of the Kyzylkums and in the zone of development of the Karshinskaya Steppe itself. [by G. Dimov] [Text] [Moscow IZVESTIYA in Russian 15 Oct 83 p 2] 11004

POWER PRODUCTION FIGURES--The Gusinoozerskaya GRES has produced 20 billion kilowatt hours of electric power since the day the plant's first machine units became operational. The second generation of this all-union shock construction project is now being erected. [by V. Ozerov] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 18 Oct 83 p 1] 11004

SURGUT GRES-1--Testing of the boiler of the 16th and last power block of the Surgut GRES-1 has been completed. When this machine unit becomes operational, the plant will be 210 megawatts "stronger," and its total output capacity will be 3,345,000 kilowats. This will happen at the end of October, a month ahead of the standard schedule. [by Yu. Perepletkin, Tyumen Oblast] [Text] [Moscow IZVESTIYA in Russian 26 Sep 83 p 1] 11004

CHIRKEYSKAYA GES-- Since the beginning of the year, the "Dagenergo" Association has saved over 11 million kilowatt-hours of electric power. Seven million were saved by the collective of the Chirkeyskaya GES--the largest in

the northern Caucasus. Having now produced a total of more than 16.5 billion kilowatt-hours of electric power, the Chirkeyskaya hydroelectric power plant has fully compensated for all of the outlays invested into its erection. The highly effective work of the GES can be explained in many ways by improvements in the equipment and the plant's reconstruction. Thus for example, technical renovation of the generator cooling system made it possible for workers of the Chirkeyskaya GES to reduce in-house consumption of electric power by 4 million kilowatt-hours per year and produce an additional 220,000 kilowatt-hours of electric power annually. [by Correspondent L. Leont'yeva, Dagestan ASSR] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Oct 83 p 1] 11004

HIGH-ALTITUDE POWER PLANT--The Spandaryanskaya GES, which is small but very important to Armenian power engineering, is being erected high in the mountains. Its creators rejected the laborious procedure of building the water conduit starting at the bottom. Instead, they decided to assemble the entire string of pipe at the top, gradually lowering it into the shaft. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Oct 83 p 6] 11004

FUEL OIL HEATER--A system created by scientists of the Chuvash State University for the Novocheboksarsk TETs-3 is significantly reducing the time it takes to drain fuel oil from rail tank cars. This work was completed on the basis of a contract of comradely cooperation. In winter months over 4,000 tank cars of fuel oil come to the heat and electric power plant. Poured into the tank cars at Bashkir refineries at a temperature of 90 degrees, it cools down during its journey, thickening to the consistency of something like bitumen. Before the fuel oil can be drained into receiving tanks, it must be heated by pumping steam heated to a temperature of 280 degrees into the tank cars for several hours. The fuel becomes saturated with moisture, and its heat value decreases. The tank cars are removed from turnover for a long period of time, and over 10,000 tons of the same fuel oil must be burned to produce the heating steam. It was established after bench and field tests that the traditional design of the device used to feed steam into the tank cars has a low efficiency. Chuvash scientists propsed fundamentally new types of devices. A design in which the shock action of a jet of steam is intensified by several orders of magnitude by a special nozzle owing to inflow of pre-heated fuel oil particles produced the largest impact. It operates as a pulverizer, actively mixing the fuel oil in the tank car and improving the impact of heat contained in the steam. Even in the severest frosts, it takes 1.5-2 hours less to heat and drain the fuel. The improved devices are being installed for the new winter season along the entire front of the unloading trestle of the Novochebokarsk TETs-3. Owing to the new technology, a significantly larger quantity of fuel could now be carried by the same number of tank cars due to their faster turnover [by Yu. Stepanov, inspector, RSFSR Committee for Peoples Control, Cheboksary] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Oct 83 p 2] 11004

MODULAR SUBSTATIONS--The Odessa affiliate of the All-Union Institute for the Planning of Electric Power Projects has developed fundamentally new substations consisting of individual completed modules not requiring foundations. The quantity of structural components has been minimized in them, and the most sophisticated lightning protection and lighting systems are employed. The units, buildings, enclosures and cable lines are laid out in a new way. All contact systems are unified: All that is left for builders to do is to assemble the modules in place. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Oct 83 p 6] 11004

POWER QUOTA SURPASSED--Power engineers of the Verkhnetagilskaya GRES completed their annual electric power production plan ahead of schedule. They are making maximum use of all reserves of production growth. Just by reducing the time it takes to make repairs on the plant, 13.6 million kilowatt-hours of extra electric power were produced. The collective of the Verkhnetagilskaya GRES has decided to produce an extra 2.1 billion kilowatt-hours of electic power before the end of the year. [by A. Maltsev, Verkhniy Tagil] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Nov 83 p 1] 11004

POWER PLANT GROWS--The city's residential blocks are spreading farther and farther to the north and northeast, and the "arteries" feeding them--the heat and power lines-- are growing increasingly longer. This also means that the sources which provide life-giving power to residential buildings in remote areas must grow larger as well. One such source is the Severnaya TETs. Since its erection began, builders of the Sevenergostroy and Sevzapenergomontazh trusts and other organizations have put four power blocks with output capacities of 100,000 kilowatts each into operation. And it was Friday night that the telephone rang in the editor's office: The builders reported that yet another 100,000 kilowatt block had been turned on. This was far from an ordinary event. The start-up of this block means more than just that the heat and power supply to large urban complexes north of Murinskiy Ruchey and others will improve significantly, even though this itself is an event of exceptional importance. It also means that construction of the first generation of one of the city's largest heat and electric power plants has been completed: Its output capacity has now attained half a million kilowatts. Thus the most important item of socialist pledges adopted by laborers of Leningrad and the oblast for 1983 was satisfied. It was satisfied exactly on schedule. However development of the TETs will not stop with this. Plans are being drawn up and preparations are being made for the erection of the second generation of the Severnaya TETs. It includes another two blocks of 170,000 kilowatts each [by A. Tabakov] [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 2 Oct 83 p 1] 11004

POWER PRODUCTION RECORD--Mingechaur (Azerbaijan SSR), 22--The Azerbaydzhanskaya GRES, which is in operation but still under construction, will soon produce its four billionth kilowatt-hour of electric power. This GRES produces almost a fourth of all electric power produced in the republic. This success is owing to the high quality with which the equipment was installed, and to competent operation, insuring sensible operation conditions for the first two power blocks, the output capacities of each of which is 300,000 kilowatts. Power production enterprises of Leningrad, the Moscow suburbs and Stavropol helped to train specialists for this GRES. [by correspondent L. Tairov] [Text] [Moscow PRAVDA 23 Sep 83 p 1] 11004

POWER LINE SURVIVES HURRICANE--Taldy-Kurgan--It was only by chance that builders of the new rural LEP-110 electric power transmission line had to take two examinations--one from the state acceptance commission and another from a hurricane wind. The power trunkline, which is over 40 kilometers long, withstood the force of the elements and was placed in the service of the agro-industrial complex of the Alakulskaya Valley, which is far away from electric power plants. This was a gift of labor by the builders in honor of the

66th anniversary of Great October. [Text] [Alma-Ata KHAZAKHSTANSKAYA PRAVDA in Russian 25 Oct 83 p 1] 11004

NEW POWER LINE--Guryev--The Guryev-Kulsary LEP-220 electric power transmission line has improved the energy balance of the developing Caspian petroleum-bearing region. This 150-kilometer line is now carrying an industrial load. It was not easy for the builders to finish things on schedule. The supports of the power transmission line were installed in marshes and on sand. Forty-five degree heat and intense wind necessitated new engineering concepts. [Text] [Moscow GUDOK in Russian 4 Oct 83 p 1] 11004

POWER LINE PLANNED--Alma-Ata--Specialists of the Kazakh department of the All-Union State Planning, Surveying and Scientific Research Institute of Power Systems and Electric Power Networks has completed plans for the new LEP-500 electric power transmission line, which will connect the powerful Ekibastuz fuel and power complex with Alma-Ata and Taldy-Kurgan oblasts. The most modern technical concepts will be employed during erection of the electric power transmission line in order to hasten construction of the energy bridge from Agadyr to the Yuzhnokazakhstanskaya GRES to Alma-Ata. For example metallic supports of an economical shape are to be employed, and the foundations for them are to be laid by special moveable machines. The electric river from Ekibastuz will make it possible to develop the industrial and agro-industrial complex of southern Kazakhstan more widely [by M. Bayzhanov] [Text] [Moscow IZVESTIYA in Russian 14 Sep 83 p 1] 11004

SIBERIAN POWER LINE PROGRESS--Novosibirsk--Linemen of the "Sibelektroset'stroy" Trust erecting a superhigh voltage line from Ekibastuz to Barnaul, which will carry 1,150 kilovolts, have completed the program for the third year of the five-year plan. Over 150 foundations and about 130 steel supports, installed and assembled in difficult conditions at the approaches to the Ob floodplain, will become the foundation for a powerful stream of energy that will give life to new enterprises and construction projects in the southern part of West Siberia. Today the best brigades led by A. Lozhnov, Yu. Komarov, Yu. Klivets and Yu. Kruglov are preparing for an important stage of construction of the 128-kilometer route--the storming of the powerful Ob, which will soon be crossed by the wires of the power transmission line. [by correspondent A. Lyakhov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 Oct 83 p 1] 11004

POWER LINE SUPPORTS--Construction of the Ekibastuz-Barnaul LEP-1150 power transmission line is proceeding at an accelerating rate. Installers of the "Sibelektroset'stroy" Trust installed the first supports of improved design. It took a day and a half to assemble each of them, while in former times this took a week. It took a second unit 2 hours to complete their assignment, while installers of the first unit had enough work to last the entire shift. This faster pace is also being achieved in the assembly of other tower parts. The plant's innovators simplified the connecting units. Each of them now uses fewer fasteners. The 40-meter towers of the older design weigh over 20 tons. Powerful fasteners were needed to hold up such monsters. Jointly with specialists of the planning and design bureau of the "Energostal'konstruktsiya"

Trust the enterprise's innovators proposed using lighter metal. Now a tower of the same height is 4 tons lighter [Text] [Frunze SOVETSKAYA KIRGIZIYA in Russian 20 Sep 83 p 2] 11004

POWER LINE SUPPORTS--Pavlodar--Construction of the Ekibastuz-Barnaul LEP-1150 power transmission line is proceeding at an accelerated rate. Installers of the "Sibelektroset'stroy" Trust installed the first support of improved design. It took a day and a half to assemble each of them, while in former times, this took a week. This KHAZAKHSTANSKAYA PRAVDA correspondent was invited to participate in a small time-and-motion study at the assembly area of the Yermak Metal Structures Plant, where production of modernized towers has been organized. The parts of supports of the old and new design were positioned at the test site. Two units of experienced assemblers began connecting the lower portions of the towers simultaneously. "The first unit is assembling a support of the old design," explained plant director G. Shukin, "and the second is assembling the new kind." It took the second unit 2 hours to complete their assignment, while installers of the first unit had enough work to last the entire shift. This faster pace is also being achieved in the assembly of other tower parts. The plant's innovators simplified the connecting units. Each of them now uses fewer fasterners. The 40-meter towers of the older design weigh over 20 tons. Powerful fasteners were needed to hold up such monsters. Jointly with specialists of the planning and design bureau of the "Energostal'konstruktsiya" Trust the enterprise's innovators proposed using lighter metal. Now a tower of the same height is 4 tons lighter. The tests showed that the new support can successfully withstand all loads [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 14 Sep 83 p 1] 11004

ALMA-ATA'S HEATING, ELECTRICAL SUPPORT--The Bureau of the Kazakhstan Communist Party Central Committee discussed at its regular meeting measures for increasing the reliability of supplying electricity and heat for the city of Alma-Ata. The decree that was adopted called for the construction of a 500 kW [as printed] power-transmission line, from Agadyr to the Yuzhno-Kazakhstanskaya GRES to Alma-Ata to send power from Ekibastuz to the Alma-Ata power system, as well as for the construction and introduction into operation of capacity at Alma-Ata's TETs's and GRES's, the Novo-Zapadnaya boilerhouse, and trunk heating grids, for the reconstruction of gas and mazut hot-water boilers at TETs-1 and the Zapadnyy Rayon Boilerhouse, and for the solution of other problems. All this will enable the reliability of the supply of electricity and heat for the city of Alma-Ata to be greatly increased. Along with this, Kazakh SSR Gosplan, a number of republic ministries and agencies and the Alma-Ata city ispolkom have been charged with developing and realizing measures that will provide for maximum reduction in heat losses in housing and other premises, and also for a reduction in hot-water consumption for production and economic needs, and each year, for the establishment of an operating mode for the city's enterprises that will take into account a reduction in power consumption during the hours of the maximum electrical load, without detriment to the fulfillment of established plans [Excerpt] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 25 Aug 83 p 1] 11409

DNESTROVSKAYA GES CONSTRUCTION--Chernovitsy Oblast--V. Fionov's brigade carried out excellently its important task on construction of the Dnestrovskaya GES. The erectors installed the electrical machine's rotor much more rapidly than called for by the schedule. The fifth machine is being prepared simultaneously with the sixth. The erectors managed to place a maximum number of lifting mechanisms on the severely confined site and to use the speedy component method of assembly to the full. The complex due for early startup is close to completion. The fifth turbine is to be put on idle running in the middle of September. By the end of the year the sixth and last power unit will go into operation. With its startup, the GES will reach design capacity--700,000 kW. The hydraulic-engineering complex's reservoir on the Dnestr will irrigate half a million hectares of land in the Ukraine's south and in Moldavia. The water supply of many populated places will be improved. [TASS] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 7 Sep 83 p 2] 11409

GES AT GORNO-ALTAYSK--Gorno-Altaysk--Detachments of hydraulic-engineering builders have come to the Gornyy Altay. Here, in a most narrow spot, where the shores of the stormy Katun converge, a GES with a capacity of 1.57 million kW is being erected. Meanwhile, preparatory work is at its peak--housing, warehouses and repair shops are being erected. A construction base for the future hydroelectric-power station--plants for large-panel housing construction and reinforced-concrete items, and other facilities--is being established. "Much work is to be performed before erection of the hydraulic-engineering complex starts," says construction chief V. Usachev. "This preparatory work must be completed prior to the arrival of the main detachment of hydraulic-engineering builders, who will come here right after startup of the last units of the Sayano-Shushenskaya GES." It is proposed to build still another series of electric-power stations on the Katun in the future. The Katun power-engineering cascade will become a part of Siberia's Unified Power System. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 1 Sep 83 p 1] 11409

GES ON KUBAN--Sary-Tyuz, Karachayevo-Cherkesskaya Autonomous Oblast--Three rivers will set high-powered electrical machines into motion at the Zelenchukskaya GES. The new GES's site is near the Asian village of Sary-Tyuz, where the Kuban storms out of North Caucasus ravines into the flatlands. Here at the headwaters, the Kuban's channel is not yet deep nor is it wide. However, it is planned to divert waters of the Bolshoy and Malyy Zelenchuk rivers, which are fed by glaciers, through a system of tunnels and high-altitude canals. These rivers will give the Kuban up to 200 million cubic meters of

water each year. This will pave the way for flooding vast areas of pasture-land, meadows and grazing lands. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 31 Aug 83 p 2] 11409

NEW KIRGHIZ GES CONSTRUCTION--Frunze--The concrete plant has gone into operation--an important event for construction of the Tash-Kumyrskaya GES in Kirghizia. Still another facility of a most important construction project of the five-year plan is operating. Startup of the enterprise has been awaited with impatience. Those who will build the construction-operations tunnel and other sections are in need of its output. With introduction of the concrete plant into operation, the builders will undertake erection of the dam. [P. Laptev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Oct 83 p 2] 11409

TENTH CHEBOKSARY GES UNIT--Cheboksary--Yesterday the 10th unit of the Cheboksary GES went into operation. The installers needed barely more than a month to install the electrical machinery. The shock work of the brigade of P. Starodubtsev, a hydraulic-works builder of 30 years' experience, provided for the success to a great extent. The collective carried out an important task--it did the assembly, tune-up and adjustment of the turbine. The brigades of V. Rekhov, G. Zvartsev and Yu. Pushkin exceeded the shift task 1½-fold to 2-fold. The brigade contract, interchangeability and high personal discipline of each person gave the installers considerable winnings in time and quality. The construction project continues to increase the pace. Preparation of a zone for flooding of the reservoir is going on full blast. The builders are strengthening its shore, dressing the slopes with concrete and masonry, and building amenities for Cheboksary's waterfront. [V. Ivanova, TASS correspondent] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Oct 83 p 1] 11409

NARYN CASCADE'S FIFTH STAGE--The builders of the Tash-Kumyrskaya GES--the fifth stage of the Naryn cascade--are working on an accelerated schedule. Its capacity is to be introduced during this five-year plan. Because of the remoteness and the difficult mountainous route, it was not possible to use fully the industrial base of the earlier Kurpsay Power-Engineering Complex. Therefore, they had to erect their own industrial base. Gravel-grading and concrete plants have already been readied for startup, half of the foundation pit for the dam has been excavated, and the builders are to remove 550,000 more cubic meters of soil. The rotating-personnel method has been introduced to speed up operations. More than 80 percent of the whole multinationality collective of builders have gone through the good school of erecting the Kurpsayskaya and Toktogul'skaya GES's. [TASS] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 8 Jul 83 p 1] 11409

MAYNSKAYA GES GENERATORS--Leningrad--Fabrication of the first hydrogenerator for the Maynskaya GES, which is on the Yenisey, has started at the Elektrosila Association. The electrical-machinery makers, together with collectives of other enterprises, have undertaken to produce equipment for the power-engineering partner of the Sayano-Shushenskaya GES. "This comparatively small electric-power station," said Yu. Grigor'yev, chairman of the coordinating council of participants in scientific and technical collaboration of builders of the Yenisey giant, "is to counter fluctuations in the water level of the

river when units of the Sayano-Shushenskaya GES are switched on or off. For, during peak-load periods, when it is switched to full capacity, the water level in the tail race jumps upward by 6 meters. It is easy to imagine what such a water barrage, which rolls down the Yenisey, can do!" The dam of the Maynskaya GES, which is located below it on the river, also dampens it. In socialist commitments that are coordinated with the builders, the collectives of the Leningrad enterprises have decided to manufacture the equipment for the Maynskaya GES in the shortest possible time. [TASS] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Sep 83 p 1] 11409

DNESTROVSKAYA GES PROGRESS--Novodnestrovsk (Chernovitsy Oblast)--V. Fionov's brigade carried out excellently its important task on construction of the Dnestrovskaya GES. The erectors installed the rotor of the electrical machine much more rapidly than called for by the schedule. The fifth machine is being assembled simultaneously with the sixth. The erectors managed to place a maximum of lifting mechanisms on the severely confined site and to use the speedy component method of assembly to the full. Mutual worker support, high labor discipline and coordination of the actions of interdependent agencies is helping. The complex due for early startup is close to completion: it is planned to put the fifth turbine on idle running in the middle of September. By the end of the year the sixth and last power unit will go into operation. With its startup, the GES will reach design capacity--700,000 kW. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 31 Aug 83 p 1] 11409

NEW EKIBASTUZ TURBINES--The thermal electric-power stations that will rise up near Kazakhstan's huge coal deposits will be equipped with turbines of a new modification with a capacity of 500 mW each. The design of such machines, which was developed by design developers of Leningradskiy Metallicheskiy zavod Association, have been successfully defended at the USSR Ministry of Power and Electrification. Components of modernized power units have been put into production at the enterprise that completed the equipping of the first Ekibastuz GRES with turbines. "The main advantage of the future machines for the complex of power stations that are being built on the basis of the enormous Kazakh coal deposits is increased efficiency," said V. K. Ryzhkov, the association's chief designer of steam turbines. "According to our calculations the new machines will require almost 10,000 fewer tons of fuel per year than has been required to generate the same amount of electricity." [LenTASS [Leningrad Department of TASS]] [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 13 Aug 83 p 1] 11409

CONTINUING AZERBAIJAN GRES CONSTRUCTION--Mingechaur, Azerbaijan SSR--Power units of the Azerbaijan GRES have generated 4 billion kWh of electricity. This goal was reached a month earlier than planned. This station's share of all the electricity generated in the republic is now almost a third. The Azerbaijan GRES continues to be under construction. Right now preparations are going on for introduction of the third high-capacity power unit. [D. Melikov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Sep 83 p 1] 11409

LAST SURGUT GRES UNIT--Surgut (Tyumen Oblast), 29 Aug--The Surgut GRES--the firstling of West Siberian power engineering, is now taking on its final shape. Under its roof, assembly of the 16th and last power unit, with a

capacity of 210,000 kW, is being completed. The Surgut electric-power station is one of the bright pages in the history of assimilation of the Tyumen North. Just like the oilfield facilities, it was built in a place of swamps and age-old taiga. So much work had to be done to bring the first power unit here at the start of the 1970's. There was no railroad, so first it was brought to Omsk, and from there along the Irtysh and Ob to its destination. Since then much has changed here. The steel rails of a mainline that connects Surgut with the country's industrial centers have arrived. A large river port and an airport are operating. You will not recognize even the GRES's construction site. Previously, for example, when the boiler installation was assembled, about 1,300 people took part. Today, at the 16th power unit, with the same amount of work, a third as many people are coping with it successfully. "We learned to do, not with numbers but with skill," says A. Ufimtsev, leader of the Komsomol youth brigade of installers. The advanced brigade was the initiator of introduction of the large-module method for installing the units. In comparison with the traditional method, the innovation permitted work time to be greatly reduced. According to the plan, the 16th power unit should go into operation in November. But the installers have named October their deadline for turnover of the important facility. During the time they have been in operation, the Surgutskaya GRES's operating units have now generated 140 billion kWh of electricity. It goes to the oil and gas field facilities of West Siberia. [TASS] [Text] [Moscow PRAVDA in Russian 30 Aug 83 p 3] 11409

CSO: 1822/29

ENERGY CONSERVATION

CEMA COUNTRIES USE PRICING TO STIMULATE SAVINGS OF FUELS, MATERIALS

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 8, Aug 83 pp 34-37

[Article by Vasiliy Marchenko of the CEMA Secretariat: "Price Stimulates the Saving of Fuel and Raw-Material Resources"]

[Text] Collaboration in the area of saving material resources.

With the growth in production activity in CEMA member countries, the demand for fuel and raw materials resources is constantly increasing. At the same time, the fields where fuel and raw materials are extracted at relatively small expense are being depleted. In order to satisfy rising demands, for example, the Soviet Union, which is making a decisive contribution to supplying the fraternal countries with fuel and raw materials, has had to go into remote and uninhabited regions and to develop fields that often are less cost effective. As a result, expenditures in the USSR for recovering 1 ton of oil during the last five-year plan were more than double those before 1972, and during the current five-year plan they have been rising still more.

Given the colossal scale that has been achieved, further buildups in the production and shipment of fuel and raw materials at the former rates are becoming economically impossible. That is why the question of improving their utilization and saving, with the use of all economic-control levers, including price, which is assigned an important role here, is being faced with such severity.

In CEMA member countries, price as an incentive for rational use of fuel and energy resources is aimed both at more complete satisfaction of the national economy's demands and at saving these resources. An appropriate pricing policy will help to solve the problems of rationalization of the structure for producing and distributing fuel and raw materials by specific consumer category, reduction in losses during acquisition, processing, transport and storage, and improvement in the quality of the fuels and raw materials.

In so doing, the main task in the fraternal countries is to stimulate maximum use of domestic fuel and power resources, primarily coal.

In the GDR for example, it is planned to increase the mining of brown coal by 1990 to 300 million tons, versus 257 million tons in 1980. In so doing, about

80 percent of the growth will be upgraded, which will enable oil and gas to be used to a greater extent as a raw material for more intense refining.

In the MLK [Hungarian People's Republic], it is planned to reduce the share of hydrocarbons in the fuel balance, from 63 percent in 1980 to 56-60 percent in 1985, through the more intensive use of domestic coal reserves.

In the RSR [Socialist Republic of Romania], coal's share in the fuel balance has been increased from 28 percent in 1975 to 40 percent in 1980; it is to be increased to 60 percent in 1985.

It should be emphasized that the economic validity of the whole system of wholesale prices is occasioned to a great extent by the devising of prices for fuel and power. With a view to stimulating domestic production thereof, prices are being established at that level that will cover production outlays and will insure the necessary average profitability.

The average price level for energy bearers is determined by taking into account the average expenditures on their production or importation. In those cases where the industry's wholesale prices do not cover the expenditures for the mining or recovery of the fuel at certain enterprises, higher wholesale prices are introduced for the enterprises (the GDR and Romania) or the enterprise's profit is redistributed at the association level (CSSR [Czechoslovak Socialist Republic]).

In Hungary, domestic wholesale prices are set on the basis of world prices in the capitalist market. At extracting enterprises that have favorable geology, a return in the nature of income with a plus sign is created, and, at enterprises with unfavorable geological conditions, with a negative sign. The established procedure for redistribution of these returns through the budget gives enterprises an economic incentive to develop domestic resources.

An increase in expenditures for extraction and an increase in world prices for energy bearers foreordains a rise in internal prices for fuel and energy, on the one hand, and a change in the price ratios for liquid, gas and solid fuels on the other. The establishment of rational price ratios for interchangeable types of fuel and of price levels for the various types are among the most important and most complicated questions of price-setting. In the USSR these problems also become involved with the regional aspect of price levels.

How are these problems being solved?

Let us take for an example, the USSR, where, beginning 1 January 1982, wholesale prices have changed.* Prices for the more effective hydrocarbon raw materials have increased to a greater degree than for solid fuel, namely, by 42

*See Glushkov, N. "Planned Price-Setting and Control of the Economy," VOPROSY EKONOMIKI [Questions of Economics], No 8, 1982; and Glushkov, N. "Price-Setting and the Economic Mechanism," EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA [The Economics and Organization of Industrial Production], No 9, 1982.

percent for coal, by 46 percent for gas, by 51 percent for mazut, and 2.3-fold for oil. Prices for coal were established for 23 basins with a differential for the grades and classes of coal, and they have a very broad range, from 2.3 to 42.8 rubles per ton of natural fuel.

For purposes of the accelerated development in Siberia of the Kansk-Achinsk and Ekibastuz basins, the new prices envision a level of profitability 2.4-2.6 fold higher than for the industry as a whole. Prices for coal here are estimated to be 3.4-3.8 fold lower than the averace prices for steam coal per ton of standard fuel equivalent. This foreordains advantageous construction at these places of a base for electric-power stations. The price ratio of steam coal by grade has been improved, based upon its quality.

Since 1 January 1982 the price ratio for fuel has been devised in such a way as to stimulate the use of local coals. In this connection, prices for gas are higher than for coal. For example, in order to stimulate the consumption of local low-quality coals in the Urals, the prices therefor are 3.7-4.6 fold lower than for gas.

Prices for oil for the country as a whole have been increased 2.3-fold and they have been differentiated by field to take mine geology into account. They provide for profitability basically for all oil-recovery production associations. For the oil refineries and for export shipments, unified prices have been introduced, as a rule, that are differentiated as a function of the degree of preparation of the crude (the content of water, salt and mechanical impurities). The new prices call for increased profitability for the more effective types of petroleum product, which will stimulate deep refining of the crude.

Prices for mazut have been set for three belts as a function of the refineries' expenditures for crude oil and of transportation costs. Prices for gas are lower than for mazut, and they have been increased 46 percent. They also are differentiated by region of the country. The rates for electricity and heat energy have risen somewhat.

As a result of the change in prices, their ratios have been improved for mutually interchangeable types of fuel: prices reflect to a greater degree the quality of the fuel and stimulate the consumption of local types of coals, they are oriented to a saving in the consumption of mazut and gas, and so on.

In other CEMA member countries, ratios of prices are being set for various types of fuel in such a way as to stimulate the consumption of solid fuel. Thus, in the GDR the ratio of prices for run-of-the-mine brown coal and of mazut were 1:2 in 1975, but 1:4.8 in 1980 and 1:6.3 in 1982, while in Czechoslovakia the price ratios for steam coal and mazut were 1:1.07 in 1976 and 1:2.92 in 1981.

The existing level of world prices for energy bearers allows the economic-feasibility ceilings for low-calorie coal and lignite deposits and for the construction of new TES's to be expanded. Price-setting simulates widely the use of such coal, since the prices for different types of it vary as a function of

the coal's consumer properties and its quality. The difference in price levels is considerable. Thus, in Bulgaria, the ratio of prices for 1 ton of fine brown coal with an ash content (for dry weight) of 65 percent and a moisture content (for operating weight) of 29 percent and of prices for large brown coal with an ash content of 18 percent and a moisture content of 8 percent has been set at 1:22.

Under modern conditions for price-setting, a comprehensive calculation is made of the useful effect of coal of various qualities according to its power-engineering worth. In Bulgaria, Hungary, the GDR, Poland and Czechoslovakia, the most important indicator in this case is the heat of combustion. In the GDR and Poland, for some types of graded coal, the main significance is accorded the heat of combustion, in a trade-off with its ash content and size. In the GDR, Poland, Romania and the USSR, ash, moisture and sulfur content are taken into consideration in the price of coal that is destined for coking or for other industrial purposes. In Hungary, the price is structured to consider the heating effect, which is a function of the type of coal, the size of the lumps, the carbonate content, and the ash and moisture content.

The economic feasibility of using coal to burn in fireboxes of the layered type and in furnaces is determined to a great extent by the fractional make-up of the coal mass. In the USSR incentive pricing for the output of graded coal of the large and medium-size classes has been intensified, thereby restricting the motivation of suppliers to send customers coal of mixed classes. This incentive yields great winnings for the national economy, since the burning of coal of the large grades in layered type fireboxes permits a 1.5-fold reduction of coal consumption for generating a unit of heat in comparison with run-of-the-mine (unsifted) coal used under the same conditions.

In a number of CEMA member countries, the system for evaluating the qualitative indicators of coal in wholesale prices is based upon the areas of use of the coal, and, in Czechoslovakia, moreover, upon the category of customers. Also of interest is the experience of Czechoslovakia in stimulating prices for the shipment of solid fuel with stable qualitative indicators that are close to optimum from the point of view of the boiler equipment's specifications. If the stipulated conditions are observed, then a higher price (by 1-2 pricing groups) is used in settlements for fuel.

The countries are also faced with the task of saving crude and petroleum product and of raising considerably the effectiveness of their use. The more common routes by which this problem is solved in most CEMA countries are those of intensifying the refining of crude, raising the quality of petroleum product, rationalizing the structure of consumption of the product with the greatest national economic benefit, and restricting the use of petroleum product for generating electricity and making maximum use of petroleum as a raw material for chemical processing. Price-setting is also aimed at solving these tasks. We have already spoken about the 2.3-fold rise in prices for oil in the USSR, which was caused by the growing level of expenditures on its recovery, a more complete consideration of the expenditures on geological exploration in the prices, and the necessity for improving the price ratios

between petroleum and petroleum product. The prices consider more fully the natural properties of the crude and the degree of its preparation for refining.

In order to stimulate growth in the economic effectiveness of oil refining, the wholesale prices for oil-refining enterprises provide for a higher level of profitability for the production of high-octane gasoline, low-sulfur diesel fuel and other petroleum product.

Bulgaria and the Republic of Cuba are systematically implementing a policy of stimulating prices by intense refining of petroleum with a view to extracting more light fuel and to making economical use of petroleum product.

And prices for gas are aimed at both extracting the gas more completely and using it more rationally. Thus, in the USSR an additional economic measure which intensifies the motivation of enterprises to increase the gathering of casing-head gas is the exclusion of investment payments from the price structure of the gas, which has raised the profitability of recovering it.

The price ratio for artificial fuel and natural gas has been established in accordance with their heat of combustion. In Romania and Czechoslovakia, in order to stimulate the chemical processing of gas, the prices in this case are set at a level lower than when it is used for power-engineering purposes.

Price incentives and improvements in utilization and saving of fuel and raw material resources are being effected in CEMA member countries in the development of charges for electricity and heat energy. The price ratio for fuel and electricity play an important role in the choice of energy bearer.

Charges for electricity are marked by complexity and diversity. But they are based upon the principles of incentives for making rational use of electricity in the national economy, for promoting technical and social progress, and for enabling reductions of current and capital expenditures, as well as for saving fuel. Charges for the heat energy that electric-power stations release have been constructed in such a way as to provide for the rational use of heat and fuel.

In Czechoslovakia and the GDR, each year the wholesale prices for fuel are raised, regardless of the prices and planned expenditures of the consuming enterprises,* with a view to making gradual savings of fuel and raw material.

For purposes of rational consumption of fuel, power and raw materials, price sanctions are applied in all CEMA member countries against enterprises that violate the established system of consumption. Most often violators pay for overconsumption in prices and charges that are 2-fold to 10-fold the ordinary price or charge. In the GDR, for example, sanctions are in effect for exceeding the established norms for consumption of fuel and power. If, at the stage of distribution of resources, the customer requires that he be allocated fuel, raw-materials or other materials above the quantity that has been computed for

*See Sabolchik, M. "The Experience of the Czechoslovak Socialist Republic in Stimulating the Saving of Fuel and of Raw Materials by Means of Wholesale Prices." EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV [Economic Collaboration of CEMA Member Countries], No 5, 1983.

him under the norms, then sanctions that amount to 10 percent of the wholesale price of the unjustified portion of the requirement are applied against him. If state ceilings for the consumption of electricity are exceeded, sanctions in the amount of 10 times the charge are applied. In Romania, the enterprise pays 10 times the usual price when gas is consumed above the established ceiling.

In its turn, the rational use of fuel raw-material resources is encouraged. Thus, in the USSR the size of deductions into the material incentive fund are differentiated, based upon the peculiarities of the various industries, to consider savings of material resources. Up to one-half the cost of the fuel and energy saved can be used in paying bonuses to production personnel and for deductions into the funds for developing production and for social and cultural measures. In the GDR, enterprises can send 40 percent of the saving of expenditures for reducing specific consumption of energy into the production development fund and 15 percent for saving energy and materials.

Thus, much work is being done by CEMA member countries to improve the use of and to save fuel and raw materials through such effective levers of economic management as prices.

In carrying out the decree of the Session of the Council and the Executive Committee of CEMA, the Conference of Agency Managers on Prices of CEMA Member Countries has in recent years systematically and purposefully studied their experience in improving methods for stimulating the more rational use and saving of fuels and raw materials by means of prices. Thus a scientific meeting was conducted within the framework of the Conference's meeting in 1981. At it, experience was exchanged and discussions were held on the problems of price incentives for the rational and thrifty use of fuel-and-power, raw-material and material resources and of preserving the environment. An analytical report with recommendations was prepared and was reviewed and approved by the Conference of Agency Managers on Prices.

Since in most countries there are pertinent solutions and positive experience that can be applied successfully in other countries, further development of collaboration in exchanging experience in this area is desirable. A continuation of such collabororation is called for in the Conference's work plans. In particular, because of the wider involvement of secondary raw materials and waste as sources of raw materials for material production and the increasing shortage of and rise in expenditures for primary raw materials, in 1983 the Conference will study the problem, "Stimulation of More Complete Utilization of Secondary Raw Materials in Industry by Means of Prices."

The use of secondary raw materials now occupies an important place in supporting the raw-materials base of CEMA member countries, In the GDR, for example, about 10-12 percent of the requirement for industrial raw materials is now being satisfied with secondary raw materials, and it is proposed to increase this share greatly. In the USSR, about 50 percent of the steel and 25 percent of nonferrous metals are being produced from secondary raw materials, and 95 percent of the blast furnace slag and about 60 percent of the rubber waste are being put to use.

The plans for the Conference's work during 1983-1984 call for a study of the interesting experience of the GDR and Czechoslovakia on the gradual, annual rise in wholesale prices for fuel without regard to the prices and planned expenditures of the consuming enterprises, with a view to saving fuel and raw materials. It is also planned to examine measures for stimulating more intensive integrated processing of raw materials (oil, gas, ores, and so on) in order to make comprehensive use of the components and to produce high-quality products in CEMA countries, by means of prices.

The enormous work to improve the use of and to save fuels and raw materials undoubtedly is bearing fruit.

The GDR has achieved substantial successes. Here the specific consumption of the types of fuel and raw and other materials that are important to the national economy was reduced by an average (in percent of preceding years) of 2.8 percent annually during 1971-1975, by 4 percent in 1979 and by 5 percent in 1980. An annual reduction of 5-5.5 percent of the specific consumption of the most important energy bearers and raw and other materials has been set as a basis for the five-year plan for 1981-1985.

During the past 10 years the USSR has reduced fuel expenditures for generating electricity to 331.3 grams from 369.6 of standard fuel equivalent for 1 kWh. The specific consumption of coke for smelting 1 ton of pig iron has been reduced from 544 kg in 1970 to 512.4 kg in 1980.

In Czechoslovakia, the estimated specific fuel consumption per unit of national income in 1970-1979 was reduced by 16 percent. It is planned, through a program for the rational use in Czechoslovakia, to obtain a saving of 11 million tons of standard fuel equivalent in 1985 and 25 million tons in 1990, in comparison with 1980.

Bulgaria, the Republic of China, Romania and other countries are also achieving savings in fuel, raw and other materials and energy.

It is important to note that the energy intensiveness of the basic types of industrial output in CEMA member countries is being reduced primarily through reduction in fuel consumption and, to a lesser extent, through reduction in the specific consumption of electricity, which corresponds to the basic trends of technical progress.

CEMA member countries have coordinated on measures for collaborating in the rational use of and saving of fuel-and-power resources in every possible way at all stages of extraction, processing, transporting and industrial application. At the 36th Meeting of the CEMA Session (June 1982 in Budapest) the necessity to strengthen reciprocal actions in the saving and rational use of fuel, energy and raw materials, including secondary materials, was noted. CEMA organs are preparing recommendations on this question that will take the fraternal countries' experience into account, for review at the 37th Meeting of the CEMA Session. Price-setting organs of CEMA countries continue to work on collaboration in this area, striving to introduce a meaningful contribution to the solution of these important tasks.

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ENERGY CONSERVATION

CEMA COOPERATION IN SAVING, MAKING BEST USE OF RESOURCES RECOUNTED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 8, Aug 83 pp 46-49

[Article by Vyacheslav Kulikov, USSR Gossnab Deputy Chairman and Chairman of the Standing Working Group on Questions of the Rational and Economical Use of Material Resources of the CEMA Committee on Collaboration in the Area of Supplying Materials and Equipment: "Savings of Material Resources: the Status and the Tasks of Collaboration"]

[Text] In an era of a dynamically developing socialist economy, the rational use of fuel, power and raw-material resources, including secondary resources, is one of the most important areas for intensifying social production.

Substantial positive changes occurred in the 1970's in development of the fuel-and-power complex and the raw-materials base of the countries of socialist collaboration. The output of primary energy resources for CEMA countries as a whole during 1971-1980 increased 1.6-fold, the recovery of oil about 1.7-fold and of natural gas and casing-head gas 2.1-fold, and the production of iron ore 122 percent and cement 141 percent.

The increasing supply of energy resources and raw materials has enabled many major tasks of the economic development of CEMA member countries to be solved successfully. At the same time, in the modern era, the problem of satisfying the requirements for fuel, energy and raw materials is becoming increasingly intense. An increase in the share of material expenditures for production outlays (up to 70 percent in industry), which increase capital investment for recovering and transporting material resources, the restricted nature of natural reserves of various types of fuel and raw materials, and growth in prices on the world market have necessitated an intensification of the collaboration of CEMA member countries for the integrated solution of problems of further increasing the effectiveness of material-resources utilization.

The solution of these questions is to a great extent taking the route of saving fuel, energy and raw and other materials in every possible way, which will to a great extent help to meet the countries' requirements from their own sources and thereby enable them to cope with the pressures of the capitalist world on the economies of the countries of socialist collaboration.

Communist and worker parties and the governments of CEMA member countries are attributing increasingly great importance to the saving and rational use of material resources. The papers of party congresses define specific tasks

for increasing the effectiveness of use of various types of fuel, energy and raw and other materials. At the various management levels of the national economy, special programs for saving and making rational use of various types of products have been adopted, appropriate organs for monitoring progress in realizing such programs have been established, and measures have been taken to increase responsibility for and to strength the incentives of the system for saving material resources. This has helped to reduce considerably the materials intensiveness of production in CEMA member countries in 1981 in comparison with 1980.

Thus, in Hungary, social product grew 1.3 percent, material expenditures only 0.5 percent. In the GDR, consumption of the most important energy bearers and raw and other materials per unit of industrial product was reduced by 5.9 percent. In the USSR, where national income increased 3.2 percent, consumption of fuel and power resources rose by 1.2 percent, at a time when the production of finished rolled section did not change and machinebuilding and metalworking output increased 6 percent. On the whole, savings of raw and other materials, fuel and energy through reduction in the materials intensiveness of production were 3 billion rubles. In Czechoslovakia the consumption of ferrous metals per unit of machinebuilding output was reduced by 18-20 percent during 1976-1981.

CEMA member nations have accumulated substantial work experience in saving and making rational use of fuel, energy and raw and other materials. Above all, its systematic, comprehensive and purposeful nature should be noted.

Thus, in Bulgaria, a National Program for Developing Power Engineering and Making Effective Use of Power-Engineering Resources in 1981-1985 and for the Period up to 1990 was developed in accordance with 12th BKP [Bulgarian Communist Party] Congress decisions; steps being taken are aimed at deeper and more integrated use of raw materials, based upon the wide introduction of low-waste or wastefree technology, which will lighten the structural weight of machines and structures, and of substitutes for materials that are in short supply, and on the utilization of secondary raw materials and of industrial waste.

In Hungary, three programs for 1981-1985 have been approved (for the rational use of energy bearers, for saving lumber and making use of its waste material, and for the utilization of secondary raw materials).

In the GDR, the Directives of the 10th SEPG [Socialist United Party of Germany] Congress called for an annual reduction of 6.1 percent in the national economy's consumption of the most important types of fuel, energy and raw and other materials, and also for meeting 12 percent of the national economy's requirement for the most important types of materials through secondary resources by 1985. In order to achieve these goals, government programs for realization of the basic tasks on saving materials and on expanding the use of secondary raw materials during 1981-1985 have been adopted.

The Basic Directions for the Economic and Social Development of the Republic of Cuba during 1981-1985, which were confirmed by the 2d Communist Party of Cuba Congress, defined the task of raising effectiveness in the use of fixed capital, raw materials, fuel and power as one of the most important tasks.

In Poland, a specific-purpose program for the integrated development of the country's energy activity during 1981-1985 and during the period up to 1990, which calls for a reduction in specific energy intensiveness of national income and of the rationalization of energy consumption, was worked out. Goals for reducing the consumption of raw and other materials in industry by 12-14 percent and in construction by 11-15 percent have been set.

In Romania, at the 12th RKP [Romanian Communist Party] Congress the Program Directive on Research and Development in the Area of Energy for the Period 1981-1985 and the Basic Directions up to the Year 2000 was adopted. Also called for was a strengthening of the national raw-materials base, implementation of a firm policy for the rational use of raw materials and the collection and processing of secondary materials.

Long-term programs for the rationalization and saving of fuel, energy and ferrous and nonferrous metals was also adopted in Czechoslovakia.

In 1981-1985, according to 26th CPSU Congress decisions, the USSR plans to save 205 million tons of standard fuel equivalent, more than 10 million tons of finished rolled ferrous metals, 4 million cubic meters of lumber and 5.4 million tons of cement. For these purposes, an integrated program for saving and for increasing the utilization effectiveness of fuel and power resources in the national economy during the period up to 1990 was developed, and the appropriate decisions have been adopted.

Ceilings on material expenditures per unit of output or of operations are set in the five-year and annual plans for economic and social development, along with tasks on reducing consumption norms.

For coordinating the work being done by USSR ministries and agencies and by Union-republic councils of ministers to improve the use of raw and other materials, fuel and energy, and also the work on current monitoring of progress in regard to the decisions that have been adopted, an Interagency Commission on Savings and the Rational Use of Material Resources has been formed. This commission is headed by the Deputy Chairman of the USSR Council of Ministers and the Chairman of USSR Gossnab. Appropriate commissions have been established in USSR branch ministries and agencies and in republics, krays and oblasts.

USSR Gossnab and its territorial organs are exercising strict state monitoring over the effective use of resources in the national economy, introducing progressive norms for the consumption of and a procedure for preserving material valuables, and discovering internal reserves for reducing the materials intensiveness of production. USSR Gossnab organs are checking about 10,000 enterprises and organizations annually on these matters.

CEMA member countries are paying much attention to improving the standards base for the consumption of material resources.

Bulgaria has created a unified list of articles and types of operations for which consumption norms for the corresponding material resources have been defined. It includes about 1,200 items, for which about 10,000 consumption

norms have been approved for more than 200 types of fuel, energy and raw and other materials. This will make it possible to compute more than 60 percent of the requirements for material resources.

In the GDR, more than 95 percent of the basic materials and raw materials and 60 percent of the auxiliary and repair materials used are accounted for by means of 12.5 million operational norms for their consumption.

The Republic of Cuba has already developed about 100,000 consumption norms for products and for spare parts for automotive transport and agricultural and construction machinery.

Similar work is also being done successfully in other CEMA member countries.

Great attention is being paid to improving the mechanism for stimulating savings and the rational use of material resources. In many CEMA member countries a standard has been established that permits from 30 to 75 percent of the cost of the material resources saved to be set aside for economic incentives. Enterprises and organizations are granted preferential credits for taking steps to save energy and resources.

Also called for is an intensification of social activeness in the matter of saving raw and other materials, fuel, energy and equipment. For these purposes, social inspections and contests are being held, and personal certificates for savings are being introduced. The corresponding indicators are considered when summing up socialist competition results.

The adoption and implementation of the Integrated Program for Further Intensifying and Improving Collaboration and Development of the Socialist Economic Integration of CEMA Member Nations has played an important role in realizing the policy of saving resources. These nations are following a policy that has proved itself, of meeting more completely the rising requirements for products of the fuel-and-power, metallurgical and other raw-materials branches of industry based upon the united efforts of the countries concerned, using various mutually advantageous forms of multilateral and bilateral collaboration, and introducing more rational and economical methods for producing and using material resources.

Interaction has been further developed and spelled out in detail in the Long-Term Specific-Purpose Program for Collaboration in Supplying the Economically Justified Requirements of CEMA Member Countries for the Basic Types of Energy, Fuel and Raw Materials During the Period up to 1990, and also in the Set of Measures and Recommendations on the Rational and Economical Use of Material Resources, which was developed in 1978 by the CEMA Committee on Collaboration in the Area of the Supplying of Materials and Equipment (henceforth the Committee). These documents contain measures for supporting the effective use of the basic types of fuel, power and raw materials, reduction in specific expenditures per unit of final product, and improvement in the use of national resources. They serve as the basis for coordinating the work of CEMA organs on these questions. This work is conducted within the frameowrk of CEMA Committees on Collaboration in the Area of the Planning Activity and in the Area of Supplying Materials and Equipment, CEMA organs on scientific and

technical and scientific collaboration, CEMA standing branch commissions and certain international economic organizations.

In order to carry out the tasks that arise from the DTsPS [Long-Term Specific-Purpose Collaboration Program] in the Area of Energy, Fuel and Raw Materials Prior to 1990, an agreement on the problem, "Reduction of Losses of Fuel During Its Storage and Transporting to Customers," has been prepared within the Committee's framework and signed by the interested countries.

Realization of this agrement will enable light and viscous petroleum product to be used more effectively, service to customers to be improved by packaging petroleum product in containers and small packaging, the collection and reclamation of spent lubricants to be increased, and losses of solid fuel during storage, transport and loading and unloading operations to be reduced. Thus, the use alone of tank trucks with bottom dispensing of petroleum product instead of top dispensing enables losses in the amount of 4-6 liters per cubic meter of volume to be reduced, and the introduction of recommendations on reduction of losses of the calorific value of coal at coal storages with a capacity of 250,000 tons will enable an economic benefit of more than 200,000 rubles annually to be obtained.

With a view to providing for a saving of copper in the machinebuilding, electrical-equipment, radio-engineering and electronics industries, recommendations on expanding collaboration have been prepared. More than 20 operations are to be conducted in 1980-1985 within the framework of the Committee and Standing CEMA Commissions on Collaboration in the Area of Nonferrous Metallurgy, the Area of Machinebuilding and the Area of the Chemical Industry, and of a number of international economic organizations.

Work continues on realization of a set of measures and recommendations on the rational and economical use of material resources. In particular, within the framework of the Committee, agreements have been prepared and signed on scientific and technical collaboration on problems of expanding the collection and processing of nonferrous-metals scrap, making wider use of cast iron with globular graphite, saving flame-resistant materials, expanding the use of secondary polymer materials, and collecting and processing solid household waste.

The Committee has approved and adopted for realization programs for collaboration on such questions as improvement of the structure for the production and consumption of rolled ferrous metals, the substitution of nonmetal pipe for steel pipe, the more effective use of semikilled and low-alloy steels, reduction in the waste of tin, a reduction of materials-intensiveness in industry and construction work, based upon the use of lightweight structure, and a reduction in cement losses.

The appropriate recommendations and information on all these matters are being prepared by standing working groups on the rational and economical use of material resources.

Scientific and design organizations of CEMA member-nation central organs for the supplying of materials and equipment are also doing joint work aimed at

creating methods for protecting products in storage and at using progressive packaging materials and lightweight packaging.

Branch standing CEMA commissions are doing much work on the saving and rational use of material resources. In accordance with their recommendations, CEMA member nations have concluded more than 15 agreements on the rational use of fuel-and-power and raw-material resources by the creation of new, effective equipment and operating processes and more comprehensive processing of raw materials, including secondary raw materials.

More than 70 problems of raising effectiveness in the use of material resources have now been included in the work plans of the CEMA branch standing commissions. During CEMA committee and commission meetings, a systematic exchange of work experience on these questions goes on. Thus, at practically each meeting of the Committee and its working organs, delegation managers inform each other about solutions adopted in their countries and the results achieved in the effective use of material resources and the use of secondary raw materials and production waste.

Conferences, seminars and symposia on similar topics are held regularly within the framework of CEMA organs. One of these conferences dedicated to interindustry questions of production and consumption of economical metal section and types of nonferrous metals was organized in April 1982 by the Committee, jointly with the Standing CEMA Commission on Collaboration in the Area of Nonferrous Metallurgy.

There are, at the same time, grounds for further expanding scientific, technical and economic collaboration in the effective use of fuel, power and raw-material resources, including secondary resources, the creation of resource-saving equipment and technology, and improvement in the exchange of information.

In this connection, at the last meetings of the Session of the Council of Economic Mutual Assistance, decisions were adopted about preparing recommendations to expand collaboration of CEMA member countries in this area. It is generally recognized that these recommendations should call for such areas of activity as:

the improvement of existing and the creation of new operating processes, machinery and equipment that are less intensive in energy and materials, and also a deepening of cooperation in producing them;

an expansion in the use of lightweight structure in machinebuilding and construction work;

an improvement of the consumption structure of the most important types of fuel, energy and raw and other materials; the creation of effective substitutes for materials that are in short supply or are being imported from capitalist countries;

the development and production of catalysts that will enable a reduction in specific energy consumption in energy-intensive processes and in the generation of heat and electricity, with the combustion of low-calorie fuels;

an expansion in the use of production and consumer waste by the development and introduction of progressive methods and technology for the collection, processing and reprocessing of secondary resources and by the creation of modern equipment that will enable the integrated use of raw materials;

a reduction in nonproductive losses of material resources at bases and storage facilities and, during their transportation and storage, by improvement of the storage and packaging activity as well as of loading and unloading equipment;

an improvement in ways and methods for programing and planning the saving of material resources, and the organization of this work in central and other organs for managing the national economy, taking CEMA member-country experience into account;

a rationalization of consumption norms for raw and other materials and for fuel per unit of finished output, taking into account the world's best results, and improvement of the structure of material reserves and of the appropriate standards;

a refinement of existing standards and the development of new ones on finished products, which will help to increase the utilization effectiveness of fuel-and-power and raw-material resources; and

invigoration of the study and introduction of advanced experience, including experience in matters of economic incentives, a wider use of cost accounting and improvements in price-setting for purposes of increasing effectiveness in the use of raw and other materials, fuel and energy, and an expansion of the practice of holding consultations and symposia and other measures for an exchange of experience in this area.

In accordance with the indicated guidance, the CEMA Committee on Collaboration in the Area of Supplying Materials and Equipment has prepared specific recommendations about the further development in CEMA organs of work on the saving and rational use of fuel-and-power and raw-material resources. These recommendations call for realization by CEMA committees and CEMA standing branch commissions of more than 80 measures for 7 types of energy resources and 9 basic types of raw-material resources. Among those planned are such major measures as boosting the development of nuclear power, modernizing existing power-engineering equipment, expanding work on the use of solar, wind and geothermal energy, biogas and secondary energy resources, accelerating work on wide introduction of powder metallurgy, plasma and laser technology in machinebuilding and on methods for restoring worn parts and components, extracting nonferrous metals from ores more completely and in integrated fashion, improving the design of constructional members, making use of modified and compressed woods, replacing foodstuffs and vegetable raw materials that are used for industrial purposes, and so on.

Realization of these measures by joint efforts undoubtedly will help to raise the effectiveness of social production and to solve successfully the social and economic problems of the CEMA member countries.

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GENERAL

PROGRESS OF CURRENT CEMA POWER-ENGINEERING PROGRAMS REVIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 83 p 20

[Article by Yu. Savenko, candidate of economic sciences: "The Power Engineering of the Fraternal Countries"]

[Excerpt] Multilateral coordination calls for the manufacture of equipment of more than 140 varieties for AES's with power units of 440 and 1,000 mW capacity, and of other equipment.

By 1982, AES's with a total capacity of 22.2 million kW were in operation in Bulgaria, Hungary, the GDR, the Soviet Union and Czechoslovakia. That year they generated 123 billion kWh or 7.7 percent of all the electricity. The construction of AES's is being promoted or preparations for them are being made in the Republic of Cuba, Poland and Romania.

Thirty-six AES power units with a total capacity of 23 million kW are now in the coordination, design or construction stages in CEMA countries (not counting the USSR). It is proposed that the share of electricity generated at AES's in various fraternal countries in 1990 will be 15-30 percent of total output, and more than 40 percent in Bulgaria.

Generation of Electricity in CEMA Member Countries
(billions of kilowatt-hours)

1970	1975	1980	1982
988	1,384	1,729	1,811

Joint Construction Projects

The Khmel'nitskaya and Yuzhnoukrainskaya AES's are being erected in the USSR with the participation of the concerned CEMA countries. The first of these is being constructed by the joint forces of Hungary, Poland, the USSR and Czechoslovakia. The Soviets are providing the construction project with technical, budgeting and financing documentation, are building the AES as a whole, and will operate the station, to include the supplying of nuclear fuel for it. The other participating members are sending to the USSR, on shared participation accounts, machinery, equipment and consumer goods. Polish construction

and installing organizations are making a substantial contribution to the construction of the Khmel'nitskaya AES.

The designed installed capacity of the Khmel'nitskaya AES will consist of four power units of 1,000 mW each. The Soviets, after putting the first unit into operation and building the appropriate power-transmission lines, will provide for the delivery of electricity to the power systems of the participating countries for 20 years. The amounts of the annual deliveries, which will be proportional to the contribution to the construction, will be 2.4 billion kWh to Hungary, 6 billion kWh to Poland and 3.6 billion kWh to Czechoslovakia.

The Yuzhnoukrainskaya AES is being built through collaboration of the USSR and Romania, which will also receive from it a share of the electricity. Both parties are working in conformance with the planned construction periods.

The countries concerned are also collaborating closely in construction of the necessary LEP [electric-power transmission line] interconnections. In research that was conducted during development of the Master Scheme, it was noted that under the proposed terms for developing OES's [unified power systems] prior to 1990, it is desirable to erect a number of 750-kV LEP interconnections.

The first of them, the Vinnitsa-Zapadnoukrainskaya (USSR)-Al'bertusha (Hungary) line, together with three substations, has already been built by the participaring countries (Bulgaria, Hungary, the GDR, Poland, the USSR and Czechoslovakia) and was put into operation at the start of 1979. Its total length is 838 kilometers--570 kilometers within the USSR. It has enabled a considerable expansion of the parallel operation of power systems and an increase in the effectiveness of parallel operation.

An industry subprogram calls for the erection by joint forces of two more 750-kV LEP's--from the Khmel'nitskaya and Yuzhnoukrainskaya AES's. An LEP from the Khmel'nitskaya AES's that is being erected by Hungary, the GDR, Poland, the USSR and Czechoslovakia will run to the Polish city of Zhemshuv, where a substation will be erected. By means of this 396-kilometer LEP, electricity will be delivered from the USSR to Poland, as well as to Hungary and Czechoslovakia as planned. Design developments have already been completed. Preparations for the line's right-of-way are being made, and preparatory work on erection of the substations has started.

From the Yuzhnoukrainskaya AES the line will run to the cities of Isaccea (Romania) and Dobruja (Bulgaria). Bulgaria, Romania and the USSR are erecting it. It is proposed to make planned deliveries of electricity from the USSR to the two other participating countries over this 649-kilometer line. Design work is now being performed for this facility. The participants have concluded contracts for delivering the basic equipment.

Exchange of Electricity Among the Power Systems of CEMA Member Countries
(billions of kilowatt-hours)

1970	1975	1980	1982
13	20	32	33

A number of other power-engineering facilities also are to be erected by the joint efforts of the countries concerned.

Power Saving and Effectiveness

Many of the measures of the subprogram for collaboration in the development of electric-power engineering relate to realization of the tasks of incorporating the national fuel and power resources of all CEMA countries into the economic turnover.

Modern electric power cannot be developed successfully without the most active use of the newest scientific and technical achievements. That is why collaboration is being deepened in such directions as improvement and assimilation of economical steam power-engineering equipment; the creation of highly flexible equipment, based on solid fuel, for covering peak and semipeak electrical loads; the development of centralized heat supply; and the creation of magnetohydrodynamic electric-power stations that operate on gas, liquid and solid fuels. Effective methods for transforming solar, wind and geothermal energy into electricity and heat energy and for creating appropriate economically feasible installations are being developed.

Multilateral scientific and technical collaboration in the area of nuclear power is being deepened considerably. In 1980 agreements were signed about performing scientific research and experimental-design development for the assimilation of power units with water-cooled water-moderated reactors with unit capacities of 1,000 mW and about the development of high-capacity breeder reactor installations.

A special DTsPS [long-term specific-purpose collaboration program] has been dedicated to questions of collaboration in the area of the economical and rational use of fuel and power. A major cycle of operations in this area is being implemented in electric power.

In order to implement a resources-saving policy at the national level in CEMA countries, appropriate decisions have been adopted and integrated programs for savings and for increasing the utilization effectiveness of fuel and power resources have been developed or are being prepared. Especially great significance has been attributed to work in this field recently.

Realization of the whole complex of problems and measures on CEMA member-country collaboration in the area of electric power is already helping and will help still more appreciably in the forthcoming growth of the national economies of the fraternal countries of socialism, economies that respond to the concerns of each of the countries and of socialist collaboration as a whole.

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GENERAL

COORDINATION OF 'KATEK'-ORIENTED RESEARCH FOUND WANTING

Moscow EKONOMICHESKAYA GAZETA in Russian No 42, Oct 83 p 15

[Article by V. Sevast'yanov, section manager of the CPSU's Krasnoyarskiy Kray Committee: "Coordination Problems"]

[Text] The Kansk-Achinsk Fuel-and-Power Complex is the most important energy base in the country's East. It is enough to recall that by the year 2000 its strip mines will yield 170-200 million tons of coal per year. The complex will include thermal stations with a total capacity of 34 million kW. The development of KATEK [the Kansk-Achinsk Fuel and Power Complex] requires the solution of many scientific and technical problems.

The large-scale introduction of scientific achievements into production and the high technical level of production are of special significance for successful solution of the tasks of intensifying production processes and the growth in every possible way of labor productivity. The recently adopted CPSU Central Committee and USSR Council of Ministers Decree, "On Measures for Accelerating Scientific and Technical Progress in the National Economy," emphasized that the most important task of party, soviet, economic, trade-union and Komsomol organs is radical improvement of all work on accelerating scientific and technical progress.

The party's Krasnoyarskiy Kraykom is paying major attention to coordinating the activity of the various participants in scientific research and the introduction of its results into production.

Right now different systems are in operation for coordinating scientific support for KATEK: industry-type, program-type and regional-type systems. Of special interest is the Special Integrated Scientific and Technical Program of USSR GKNT [State Committee for Science and Technology], the USSR Academy of Sciences and USSR Gosplan, which coordinates such particular programs as "Energy" of RSFSR Minvuz [Ministry of Higher and Specialized Secondary Education], "Coals of the Kansk-Achinsk Basin" of the AN SSSR [USSR Academy of Sciences], and branch-ministry programs. Krasnoyarskiy Kray's economic programs and the Coordinating Council on Problems of Establishing and Developing KATEK, which is under the CPSU's Krasnoyarskiy Kraykom, are playing a definite role.

Many of KATEK's scientific and technical problems are being resolved by the efforts of production specialists and of scientists from academic institutions, the industry, and institutions of higher learning.

Krasnoyarsk's scientists and specialists are taking an active part in practically all scientific and technical research. They are working on problems of improving the equipment and technology for excavating the fields, including a search for basically new methods for mining, transporting and storing the coal and for the integrated processing of Kansk-Achinsk coal into liquid fuel and other chemical products by gasification and supercritical dissolution. Studies are being made on the use of underground-gasification technology for local coal and on improvement of the traditional methods for burning coal. The fundamentals of wastefree technology and the use of secondary raw materials in construction and agriculture are being worked out. Research in the area of managing the establishment and development of KATEK is playing an important role.

However, as experience indicates, the existing forms for coordinating scientific research on KATEK problems are still not resolving the whole complex of scientific and technical tasks with the required effectiveness.

Failure to solve coordination problems causes certain plan tasks for using Kansk-Achinsk Basin coal to be threatened with failure. Such a situation arises in solving the problem of obtaining synthetic liquid fuel from Kansk-Achinsk coal. Working on this problem are the Institute of Fuel Minerals of USSR Minugleprom [Ministry of Coal Industry], the AN SSSR Institute of High Temperatures, the Institute of Hydrolysis of SO [Siberian Department] AN SSSR, and the Institute of Chemistry and Chemical Technology of KATEKniiugol' [KATEK Scientific-Research Institute for Coal] of SO AN SSSR--in all, about 40 scientific organizations.

One of the ways for obtaining synthetic liquid fuel from coal that is being developed domestically is the pyrolysis process, in which coal is heated to a temperature of 300-600 degrees C in an inert medium. In the opinion of specialists, liquid fuel can comprise 3-5 percent of the weight of the coal being processed. Such an industrial process cannot be viewed as the basic one for obtaining synthetic liquid fuel from Kansk-Achinsk Basin brown coal. Participants at a session of the Coordinating Council on Special Integrated Programs for KATEK and the Bureau of the Scientific Council of USSR GKNT for Obtaining Synthetic Fuel came to this conclusion.

Another direction in the development of work to obtain liquid fuel is the hydrogenation of Kansk-Achinsk coal. This technology is being developed intensively by USSR Minugleprom's Institute of Fuel Minerals. The production of liquid fuel on the basis of this technology is more realistic for the near term, but there are unsolved problems here of allocating scientific forces and material resources.

In particular, conversion of the organic mass of Kansk-Achinsk coal into liquid fuel requires that the coal be saturated with hydrogen, which is obtained externally. The requirement for it is extremely substantial, and there are no

production facilities of any kind for providing it, and none are called for, although the technology that uses hydrogen should be in use at the end of the five-year plan. And only upon the insistent recommendation of the Coordinating Council was this topic introduced recently by KATEKugol's scientific research institute and the SO AN SSSR Institute of Chemistry and Chemical Technology. Yet much time will still be required to obtain scientific results and to put them into practice. Another problem of this technology is that it uses an expensive raw material for the catalyst that still has not found a place in the coordination plan.

The insufficiency of coordination consists in the fact that levers for strengthening discipline on the part of the doers are lacking. For example, the basin's coal contains up to 37 percent moisture, and hauling the coal over long distances is unprofitable. Therefore, the Special Integrated Scientific and Technical Program for the Development of KATEK calls for the development of a coal-dehydration installation--Termougol'-100.

Minenergomash [Ministry of Power Machine Building] design organizations should participate in creating it. But, despite reminders by the program's coordination council and by Minugleprom, they still have not started to fulfill this task.

In the plan for processing Kansk-Achinsk Basin coal into liquid fuel, work on supercritical dissolution of the coal, which allows a product to be obtained that is qualitatively on a par with petroleum mazut, is of interest. USSR Minugleprom's KATEKniiugol' is doing this work but it does not have a substantial material base.

USSR Minenergo [Ministry of Power and Electrification] has refused to finance the Siberian VTI's [Higher Technical Institute's] study of the kinetics of the formation of nitrous oxides when coal dust is burned, and, because of a lack of funds, research on mathematical simulation of optimization of firebox processes for purposes of designing firebox installations is not being supported.

In order to increase the contribution of scientific-research institutes and vuzes in the matter of developing KATEK, it is necessary to explore the possibility of financing, both by earmarked funds and by the funds of production enterprises that are taking part in developing the program. The basic research that is now being performed is laying the foundation for scientific and technical progress of the next decade. And from this standpoint it is important that plans for scientific and technical progress of the industries involved call for more complete use of science's potential, primarily of Krasnoyarskiy Kray's scientific institutions and vuzes.

Another urgent problem is the support of scientific research with specially made instruments and equipment and modern measuring equipment. The organization of centers for collective utilization, taking the experience of Leningrad, Ufa and other cities into account, is desirable. The practice of using specially built and expensive equipment of the Krasnoyark region's scientific institutions for solving common tasks that concern KATEK could be a first step in this direction. It is very important that the USSR Academy of Sciences and its Siberian Department and RSFSR Minvuz support the initiative of

the Krasnoyarsk Branch of the SO AN SSSR and of Krasnoyarsk city's vuzes to establish such centers for collective utilization and to extend their assistance.

As for the training of highly qualified scientific personnel for intermediate, higher and managerial elements, this could be organized more rapidly on the basis of Novosibirsk and Krasnoyarsk universities, Central Siberian vuzes and SO AN SSSR institutes.

The work experience of the Coordinating Council, which functions on the basis of social initiatives, indicates that the effectiveness of its actions depends greatly upon the vigor of the council's members, who represent the various organizations, and on the capabilities of these organizations, which are determined by their scientific potential and the system for financing scientific research. The Coordinating Council, unfortunately, does not have sufficiently broad rights (in regard to the planning, financing and management of scientific research in all areas of KATEK's numerous problems). It would seem that well-ordered and comprehensive coordination of scientific support for KATEK should be based upon still greater centralization of the control of scientific research within the framework of the special-purpose program and a more improved system of earmarked financing.

The solution of this problem is definitely associated with the matter of interagency control of the establishment and development of the Kansk-Achinsk Fuel and Power Complex, which could be supplied by a legal regulatory organ with monitoring and coordination functions.

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METALLURGICAL SUPPORT BEING STRESSED AT NUCLEAR POWER MACHINEBUILDING PLANT

Leningrad LENINGRADSKAYA PRAVDA in Russian 21 Sep 83 p 2

[Article by G. Shutkov, general director of the Izhorskiy Zavod Association: "At the Leading Edge"]

[Text] Every time our enterprise is named the standard-bearer of nuclear power machinebuilding, we, the enterprise's supervisors, involuntarily think: does the collective completely live up to this honorable title? However, still another question disturbs us even more: has everything been done to insure that the Izhortsy will cope successfully with their most complicated tasks in the future?

And so, right now, in thinking about these questions, we refer increasingly frequently not to the number of reactors produced for nuclear electric-power stations but to the unit capacity of the power equipment that is produced and to the production potential that we have, which, in the final analysis, also governs all our capabilities.

Metallurgical production has the greatest importance for our enterprise. Figuratively speaking, this is the rear area whose reliability is essential if our attack plans are to hold promise and if strategic success is to be feasible. Unfortunately, we undervalued this circumstance somewhat not so long ago. The association's capacity was being developed unevenly--machinebuilding type departments were capable of achieving results much greater than those allowed them by the metallurgical departments. And to top it all, disproportions in development of the various subdivisions persisted for a long time within metallurgical production. Thus, the supply and equipment base for the repair of furnaces and of elevating and conveying equipment, for the track activity, and for auxiliary sections for steelmaking has been especially lagging.

And already the first steps for improving the operation of in-house transport, the furnace-charging activity and a large number of other subunits have indicated that we can achieve considerable improvement in our affairs by overcoming the former nonintegrated approach. Especially in organizing the work of the metallurgical departments at the initial stages of the production process, during preparations for production and for equipment startup.

Production within the association has grown 19.4 percent in 2½ years. The Izhortsy have not maintained this pace very long. In this case, output of the basic product--equipment for nuclear power stations--increased 62.4 percent over 1980's. This achievement would have been impossible had power machinebuilding production work been based upon the former foundation, had it had the same weak rear area that it did before increased attention was paid to metallurgical production.

What is there to reflect this increased attention, and how has it been realized? The main points here are, perhaps, not individual measures, even very effective measures, but, rather, the strategy and tactics of the operations. In striving to get out of the fix in which the work section had spent such a long time uneventfully, the enterprise's supervisors and its party committee realized that no kind of hole-patching of any kind, no half measures of any kind, would help here, and, therefore, they tried to teach production chiefs, specialists and workers decisiveness, and, I would say, audacity in setting new goals. We had considered that if we operated as usual, oriented to growth indicators of 5, 10 or 15 percent, then there was no use in thinking about important changes. Really decisive measures were needed. Such as, for example, the organization of finished-product sections, which permitted cooperation among departments to be simplified and the amount of in-house hauling and the whole cycle for creating complicated equipment to be sharply reduced. It was such a section that increased pipeline output 3-fold, and this was not an isolated example.

Of course, not by far have all the specialists proved to be ready to take such decisive actions. Some do not have enough daring, others lack vocational preparedness, and a third group lacks the desire for greater rather than less strain. Naturally, under these circumstances, many people have had to be occupied with questions of assigning personnel, but the collective only profited from it. While solving the problems of increased complexity, many of our talented managers, first-class operating engineers and workers of the highest qualifications have matured.

Here is a typical episode. At the forging and pressworking department, work was in progress on one of the first giant forgings from an ingot that weighed 290 tons. It seemed that the specialists had considered everything in preparing to carry out the special task, but they did not get by without a surprise. When they took the billet, which had been brought almost to a white heat, from the furnace and raised it up with two overhead traveling cranes, the cumbersome multiton thing suddenly began to bend under its own weight. Had there been delay the forging would have had to be sent to scrap, it would not have been possible to bring it to the press. But at this important moment, department chief B. A. Derevyanko made a decision that astounded many: "Everyone get out of the forging shop! Let it do what it will!" Valeriy Petrovich Petrochenko, who was sitting at the control panel of an automated complex, stayed face to face, as they say, with the forging, when even the foreman had been compelled to move aside. And he withstood the experience: skillfully interacting with the crane operators, the cumbersome thing was nevertheless put in the press, and then they also managed to eliminate the bending.

No one threw the forging shop into confusion with contradictory orders or advice from different quarters--this is what insured success. But would people have acted with such independence had they not been psychologically ready for out-of-the-ordinary situations!

Of course, matters rarely come to such dramatic encounters, but boldness, decisiveness and acting with initiative were constantly required of the metallurgists. Indeed, the necessity for an accelerated pace for developing nuclear power machinebuilding moved our enterprise into a leading position in the output of outsize forged billets for reactor, heat-exchanger, turbine and turbogenerator equipment. In accomplishing this task, the Izhortsy mastered steel production at the country's largest furnaces for electroslag and vacuum-arc remelting and manufacture of the largest of ingots from heat-resistant steels--their maximum weight having increased from 120 to 290 tons.

The enterprise's metallurgical base is being transformed into a singular laboratory where advanced scientific and technical achievements are verified. This circumstance is an objective necessity, which governs our forward motion. Indeed, could the association have mastered, in the briefest of periods, the series production of rotors for high-speed turbines of 1,000-mW capacity, which the Leningradskiy Metallicheskiy plant has begun to produce, had it not transferred rapidly to a technology for manufacturing forgings from ingots that weighed 235 tons and to a technology that insures high quality of metal throughout the whole cross-section of such a large rotor billet. As a result, we began to produce these rotors, not by welding but with solid forgings, which reduce labor intensiveness of manufacture of the turbine itself by almost two-thirds.

The association has established a section for manufacturing super-large ingots that weigh 420-520 tons, which will enable a new and decisive step to be taken in supporting the output of highly economical and high-quality billets for power machinebuilding in the next few years, after open-hearth furnaces have been replaced by electric furnaces and after a complex of research work has been performed.

Enterprise measures have proved that the policy being adhered to is the true one. Thus, the use of fully forged billets--ellipsoids for reactor covers for the million-kilowatter--has enabled the manufacturing cycle for these important articles to be halved and high reliability of them to be achieved simultaneously.

Metallurgical production has been developing in several directions all at once with maximum intensity in recent years. New capacity has been built and existing capacity rebuilt, highly efficient industrial processes have been introduced, special equipment has been assimilated, and specialization and improvement in organizing the work of subunits have been deepened. Operations are to proceed on that same plane in the next few years, the only difference being that they will be more rapid and more persistent.

The development of new power equipment, which is being conducted over a broad front as a reserve of scientific and technical work, portends for the

enterprise's collective--primarily the metallurgists--a step unprecedented in complexity in the mastery, not so much of new grades of steel as of outsize billets that will meet the highest demands for metal purity and density and for physical, chemical and operating properties. All these will require the most modern technology, the most improved equipment, and new methods and means for monitoring quality. But such a prospect, it would seem, will not catch us by surprise. Already today, purposeful preparation for this prospect is going on, in the most intimate contact with specialists of NPO TsNIITMASH [Science and Production Association of the Central Scientific-Research Institute of Heavy Machinebuilding] and a large number of the country's large scientific organizations.

Work has started, for example, on modernization of the country's largest press, with a capacity of 12,000 tons-force. It will be equipped with a forging crane of 700 tons' capacity and a special manipulator that can "handle" billets of much larger dimensions.

We are paying special attention right now to the erection of a highly productive "5000" rolling mill. It will enable the nuclear-power engineers' needs for thick-walled rolled metal, for rollings made from nonmagnetic stainless steels, and for other products that have become increasingly scarce to be satisfied. The first-phase complex that is due for early startup is to be turned over for operation during this five-year plan. In the next five-year plan, the next phase of the mill will be put into operation.

Measures will be taken simultaneously to develop capacity for the heat treatment of metal. Right now the design of a new steelmaking department is being born. True, not everything is going on smoothly here. Lengipromez [Leningrad State Institute for Metallurgical Plant Design] specialists, on the recommendation of USSR Minchermet [Ministry of Ferrous Metallurgy], are incorporating in the design a choice of structure for an electric furnace that is not optimal by far. The choice perhaps meets today's requirements but tomorrow's not at all, since the main support for it is being made on the basis of quantitative indicators, not qualitative indicators. It is desirable, when solving this problem, which is controversial but extraordinarily important and of far-reaching consequences, that the designers cooperate with the specialists of our ministry's NPO TsNIITMASh and of the prime institutes of Minchermet and the State Committee for Science and Technology.

The requirement to approach all steps in developing the metallurgical base of such a large enterprise as ours with full responsibility is prompted primarily by the fact that the metallurgical capacity operates for a much longer period than the machinebuilding capacity. It should be created unfailingly with an eye to the future. Unless this is done, the collective will not fulfill those most complicated tasks that the party and the government have charged it with solving.

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